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 NEWS  3  May 12   EXTEND option available in structure searching
 NEWS  4  May 12   Polymer links for the POLYLINK command completed in REGISTRY
 NEWS  5  May 27   New UPM (Update Code Maximum) field for more efficient patent
                   SDIs in CAplus
 NEWS  6  May 27   CAplus super roles and document types searchable in REGISTRY
 NEWS  7  Jun 28   Additional enzyme-catalyzed reactions added to CASREACT
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                   and WATER from CSA now available on STN(R)
 NEWS  9  Jul 12   BEILSTEIN enhanced with new display and select options,
                   resulting in a closer connection to BABS
 NEWS 10  Jul 30   BEILSTEIN on STN workshop to be held August 24 in conjunction
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                   Patent Office Classifications
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                   228th ACS National Meeting
 NEWS 14  AUG 02   The Analysis Edition of STN Express with Discover!
                   (Version 7.01 for Windows) now available
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                   STN Express with Discover! will change September 1, 2004

 NEWS EXPRESS  JULY 30 CURRENT WINDOWS VERSION IS V7.01, CURRENT
               MACINTOSH VERSION IS V6.0c(ENG) AND V6.0Jc(JP),
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=> file medline, biosis, wpids, fsta, embase, japio, dgene, hcaplus, uspatful
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=> s recrystallization with inhibition
L1          73 RECRYSTALLIZATION WITH INHIBITION

=> s thermal hysteresis protein
L2         231 THERMAL HYSTERESIS PROTEIN

=> s l2 and l1
L3           6 L2 AND L1

=> d l3 ti abs ibib tot

L3   ANSWER 1 OF 6  BIOSIS  COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
TI   Tracking the profile of a specific antifreeze protein and its contribution
     to the thermal hysteresis activity in cold hardy insects.
AB   This study summarizes some important new directions in research on
     antifreeze protein biosynthesis and regulation.  It describes the recent
     development and availability of essential biochemical and cellular tools
     that make possible more direct cellular investigations, and an assessment
     of the relationship between thermal hysteresis
     protein (THP) levels and antifreeze activity (both thermal
     hysteresis and recrystallization inhibition (RI)).
     These tools include: 1) the isolation of a specific THP of high activity
     (designated Tm 12.86), and an additional endogenous activating factor of
     this antifreeze protein; 2) the ability to track the cellular and
     secretory patterns of Tm 12.86 immunologically; 3) the use of an in vitro
     fat body cell culture system for direct investigation of cellular events.
     and, 4) a means of quantifying RI behavior of purified Tm 12.86, and
     samples of unknown concentrations of THPs, to provide a more sensitive
     detection method for antifreeze activity at scaled down values associated
     with the in vitro system.  In combination, these studies indicate that the
     adaptation mechanisms contributing to the overall antifreeze protein
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```

antifreeze proteins and endogenous activators of these proteins. With the availability of these key tools, the details of a precise and seasonal regulation of these antifreeze protein/activator interactions, which ultimately generate an efficient cold hardy response, now have the potential to be worked out.

ACCESSION NUMBER: 1996:538806 BIOSIS
DOCUMENT NUMBER: PREV199699261162
TITLE: Tracking the profile of a specific antifreeze protein and its contribution to the thermal hysteresis activity in cold hardy insects.
AUTHOR(S): Horwath, Kathleen L. [Reprint author]; Easton, Christopher M.; Poggioli., George J., Jr.; Myers, Kevin; Schnorr, Ingrid L.
CORPORATE SOURCE: Dep. Biol. Sci., Binghamton Univ., Binghamton, NY 13902-6000, USA
SOURCE: European Journal of Entomology, (1996) Vol. 93, No. 3, pp. 419-433.
ISSN: 1210-5759.
DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 10 Dec 1996
Last Updated on STN: 10 Dec 1996

L3 ANSWER 2 OF 6 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN
TI New cDNA polynucleotide encoding a **thermal hysteresis protein** which is a Type III anti-freeze protein derived from the Tenebrionoidea Superfamily, useful for providing antifreeze protection to improve the quality of food.
AN 2002-090137 [12] WPIDS
AB WO 200194378 A UPAB: 20020221
NOVELTY - A cDNA polynucleotide (I) comprising a nucleotide sequence for encoding a **thermal hysteresis protein** which is a Type III anti-freeze protein derived from the Tenebrionoidea Superfamily, is new.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are included for the following:

(1) a mRNA polynucleotide (II) comprising a nucleotide sequence for encoding thermal hysteresis proteins derived from the Tenebrionoidea Superfamily transcribed from (I);

(2) a DNA or RNA probe having a sequence complementary or identical to a sequence of contiguous nucleotides for at least a portion of (I);

(3) a recombinant vector containing (I);

(4) a **thermal hysteresis protein**, preferably an endogenous Type III anti-freeze proteins, derived from the Tenebrionoidea Superfamily which lowers the freezing point of a solution without effecting the melting point of the solution;

(5) a consensus sequence with a nucleotide sequence selected from one of the four 481 nucleotide sequences (S1-S4) defined in the specification;

(6) a consensus sequence with an amino acid sequence selected from the 133 (S5), 134 (S6), another 134 (S7), another 134 (S8) amino acid sequence defined in the specification;

(7) a consensus sequence with the 133 amino acid sequence (S9) defined in the specification;

(8) a primer having a nucleotide sequence selected from P1-P3;

(9) a method (M1) for producing a polypeptide having antifreeze properties comprising forming a cloning vector with a Tm 12.86 family member gene encoding an antifreeze polypeptide, transferring genes of the cloning vector into DNA of host cell to create a transformed cell, expressing a mRNA sequence and a translated amino acid sequence from the recombinant expression vector, the sequence being isoforms of the Tm 12.86 T. molitor antifreeze polypeptide;

(10) a method (M2) for providing antifreeze or **recrystallization inhibition** properties to a subject formulation comprising incorporating at least 0.1 micrograms to 1 mg of an

activated polypeptide into 1 ml of a subject formulation to obtain **recrystallization inhibition** or 1 mg to 25 mg of the activated polypeptide into 1 ml of a subject formulation to thermal hysteresis;

(11) a Tm 12.86 antibody/antiserum;

(12) a **recrystallization inhibition** method (M3) for determining the presence, relative concentration, and/or activity of thermal hysteresis proteins comprising providing a proteinaceous composition in a solvent to form a test solution, flash freezing the solution, raising the temperature of the frozen solution to an appropriate annealing temperature that allows for a partial melt, while limiting heterogeneity in ice grain sizes within the solution, maintaining the frozen solution at the annealing temperature for a length of time sufficient to allow for recrystallization, monitoring the ice crystal grain size changes over time, and determining the presence of functional thermal hysteresis proteins in the solution given the retention of significantly smaller ice crystal grain sizes relative to at least one control solution;

(13) a method for quantitatively assessing the extent of recrystallization occurring in frozen foods, and the impact of solution additives to inhibit or limit recrystallization according to the process defined in M3; and

(14) a method for quantitatively assessing and comparing the effectiveness of cryoprotective solutions on the extent of recrystallization occurring in cryopreserved cells, tissues, solutions and the like, according to the process defined in M3.

CGCGGATCCCTCACCGACGAACAG (P1);

GAGAGGATAACTAATTGAGCTCGCC (P2); and

CGCGGATCCCTGACCGAGGCACAA (P3).

USE - The activated anti-freeze protein is incorporated into:

(a) plant, produce or fish in an amount sufficient to provide antifreeze protection;

(b) a region of a target tissue in an amount sufficient to provide antifreeze protein controlled limited tumor cell or target tissue cryoinjury during cryosurgery;

(c) hypothermic solutions or bathing media to reduce cold damage in order to provide cryogenic or hypothermic preservation of cells and tissues by incorporating the protein into the cells, tissue, or cell membranes in a controlled amount sufficient to provide antifreeze protection;

(d) de-icing formulations or used on surfaces to reduce existing ice buildup or abate the formation of ice buildup on surfaces such as a road, aircraft, household products, cosmetic products, machinery and plant surfaces; or

(e) a food product in an amount sufficient to provide antifreeze protection to improve the quality of food by abating freezing of solutions, freezer burn, or degradation due to cold storage.

The polynucleotides for the activated protein are used to create transgenic or gene-modified plants, crops, fish, or animals having greater tolerance to cold climatization. The Tm 12.86 antibody/antiserum is used as a screening device to identify positive recombinant plaques containing cloned inserts capable in an expression vector system to produce recombinant products recognized by the antibody/antiserum. The Tm 12.86 antibody/antiserum which is also used as a screening device to screen cDNA libraries in an expression system, including cross-species cDNA libraries to identify homologous sequences in other species.

M3 is used for concurrent multiple sample testing of solutions which includes the 'sandwich' method; and application via a 96 well plate device (all claimed).

Dwg.0/8

ACCESSION NUMBER: 2002-090137 [12] WPIDS

DOC. NO. CPI: C2002-027870

TITLE: New cDNA polynucleotide encoding a **thermal hysteresis protein** which is a Type III

anti-freeze protein derived from the Tenebrionoidea Superfamily, useful for providing antifreeze protection to improve the quality of food.

DERWENT CLASS: C06 D16
INVENTOR(S): HORWATH, K L; MEYERS, K L; EASTON, C M; MYERS, K L
PATENT ASSIGNEE(S): (EAST-I) EASTON C M; (HORW-I) HORWATH K L; (MYER-I) MYERS K L; (UYNY) UNIV NEW YORK STATE RES FOUND; (MEYE-I) MEYERS K L
COUNTRY COUNT: 91
PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG
WO 2001094378	A1	20011213	(200212)*	EN	231
RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZW					
W: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW					
AU 2001075389	A	20011217	(200225)		
US 2002172951	A1	20021121	(200279)		
US 2002173024	A1	20021121	(200279)		

APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
WO 2001094378	A1	WO 2001-US18532	20010607
AU 2001075389	A	AU 2001-75389	20010607
US 2002172951	A1 Provisional	US 2000-210446P	20000608
		US 2001-876348	20010607
US 2002173024	A1 Provisional	US 2000-210446P	20000608
		US 2001-876796	20010607

FILING DETAILS:

PATENT NO	KIND		PATENT NO
AU 2001075389	A	Based on	WO 2001094378

PRIORITY APPLN. INFO: US 2000-210446P 20000608; US 2001-876348 20010607; US 2001-876796 20010607

L3 ANSWER 3 OF 6 USPATFULL on STN
TI Nucleic acid sequences encoding type III tenebrio antifreeze proteins and method for assaying activity
AB Thermal hysteresis proteins and their nucleotide sequences derived from the Tenebrionoidea Superfamily which lower the freezing point of a solution without effecting the melting point. Related methods for preparing said proteins and for providing antifreeze or **recrystallization inhibition** properties to a subject formulation.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
ACCESSION NUMBER: 2002:307900 USPATFULL
TITLE: Nucleic acid sequences encoding type III tenebrio antifreeze proteins and method for assaying activity
INVENTOR(S): Horwath, Kathleen L., Endwell, NY, UNITED STATES
Easton, Christopher M., Ithaca, NY, UNITED STATES

NUMBER	KIND	DATE

PATENT INFORMATION: US 2002173024 A1 20021121
APPLICATION INFO.: US 2001-876796 A1 20010607 (9)

	NUMBER	DATE
PRIORITY INFORMATION:	US 2000-210446P	20000608 (60)

DOCUMENT TYPE: Utility
FILE SEGMENT: APPLICATION
LEGAL REPRESENTATIVE: Mark Levy, SALZMAN & LEVY, Ste. 902, 19 Chenango St., Binghamton, NY, 13901
NUMBER OF CLAIMS: 40
EXEMPLARY CLAIM: 1
NUMBER OF DRAWINGS: 131 Drawing Page(s)
LINE COUNT: 10082
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L3 ANSWER 4 OF 6 USPATFULL on STN
TI Nucleic acid sequences encoding type III tenebrio antifreeze proteins and method for assaying activity
AB A **recrystallization inhibition** method for determining the presence, relative concentration, and/or activity of thermal hysteresis proteins comprising: providing a proteinaceous composition in a solvent to form a test solution; flash freezing said solution; raising the temperature of the frozen solution to an appropriate annealing temperature that allows for a partial melt, while limiting heterogeneity in ice grain sizes within said solution; maintaining said frozen solution at the annealing temperature for a length of time sufficient to allow for recrystallization; monitoring the ice crystal grain size changes over time; and determining the presence of functional thermal hysteresis proteins in said solution given the retention of significantly smaller ice crystal grain sizes relative to at least one control solution.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
ACCESSION NUMBER: 2002:307828 USPATFULL
TITLE: Nucleic acid sequences encoding type III tenebrio antifreeze proteins and method for assaying activity
INVENTOR(S): Horwath, Kathleen L., Endwell, NY, UNITED STATES
Meyers, Kevin L., Trumansburg, NY, UNITED STATES

	NUMBER	KIND	DATE
PATENT INFORMATION:	US 2002172951	A1	20021121
APPLICATION INFO.:	US 2001-876348	A1	20010607 (9)

	NUMBER	DATE
PRIORITY INFORMATION:	US 2000-210446P	20000608 (60)

DOCUMENT TYPE: Utility
FILE SEGMENT: APPLICATION
LEGAL REPRESENTATIVE: Mark Levy, SALZMAN & LEVY, Ste. 902, 19 Chenango St., Binghamton, NY, 13901
NUMBER OF CLAIMS: 34
EXEMPLARY CLAIM: 1
NUMBER OF DRAWINGS: 131 Drawing Page(s)
LINE COUNT: 10121
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L3 ANSWER 5 OF 6 USPATFULL on STN
TI Transgenic plants having a nucleic acid sequence encoding a dendroides antifreeze protein
AB The present invention is directed to transgenic plants having nucleic acid sequences encoding Dendroides canadensis thermal hysteresis proteins. The THPs of Dendroides have significantly greater thermal

hysteresis activity than any other known anti-freeze protein. The thermal hysteresis activity of the purified THPs can be further enhanced by combining the THPs with various "activating" compounds.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
ACCESSION NUMBER: 97:45207 USPATFULL
TITLE: Transgenic plants having a nucleic acid sequence encoding a dendroides antifreeze protein
INVENTOR(S): Duman, John G., South Bend, IN, United States
PATENT ASSIGNEE(S): University of Notre Dame du Lac, Notre Dame, IN, United States (U.S. corporation)

	NUMBER	KIND	DATE
PATENT INFORMATION:	US 5633451		19970527
APPLICATION INFO.:	US 1995-569594		19951208 (8)

RELATED APPLN. INFO.: Division of Ser. No. US 1995-485359, filed on 7 Jun 1995
DOCUMENT TYPE: Utility
FILE SEGMENT: Granted
PRIMARY EXAMINER: Fox, David T.
ASSISTANT EXAMINER: Haas, Thomas
LEGAL REPRESENTATIVE: Barnes & Thornburg
NUMBER OF CLAIMS: 1
EXEMPLARY CLAIM: 1
NUMBER OF DRAWINGS: 9 Drawing Figure(s); 5 Drawing Page(s)
LINE COUNT: 966
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L3 ANSWER 6 OF 6 USPATFULL on STN
TI Nucleic acid sequences encoding dendroides antifreeze proteins
AB The present invention is directed to nucleic acid sequences encoding Dendroides canadensis thermal hysteresis proteins. The THPs of Dendroides have significantly greater thermal hysteresis activity than any other known anti-freeze protein. The thermal hysteresis activity of the purified THPs can be further enhanced by combining the THPs with various "activating" compounds.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
ACCESSION NUMBER: 97:38394 USPATFULL
TITLE: Nucleic acid sequences encoding dendroides antifreeze proteins
INVENTOR(S): Duman, John G., South Bend, IN, United States
PATENT ASSIGNEE(S): University of Notre Dame du Lac, Notre Dame, IN, United States (U.S. corporation)

	NUMBER	KIND	DATE
PATENT INFORMATION:	US 5627051		19970506
APPLICATION INFO.:	US 1995-485359		19950607 (8)

DOCUMENT TYPE: Utility
FILE SEGMENT: Granted
PRIMARY EXAMINER: Jacobson, Dian C.
ASSISTANT EXAMINER: Lau, Kawai
LEGAL REPRESENTATIVE: Barnes & Thornburg
NUMBER OF CLAIMS: 4
EXEMPLARY CLAIM: 1
NUMBER OF DRAWINGS: 9 Drawing Figure(s); 5 Drawing Page(s)
LINE COUNT: 959
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

=> e horwath, k/au
E1 18 HORWATH WINTER J/AU

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E3             0 --> HORWATH, K/AU
E4             1      HORWATITISCH H/AU
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E6            17      HORWATITSCH HEINZ/AU
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E8             8      HORWATT E/AU
E9             1      HORWATT EWA/AU
E10            3      HORWATT K/AU
E11            2      HORWATT P M/AU
E12            2      HORWATT PETER M/AU

=> e meyers, k/au
E1             1      MEYERS ZU HERINGDORF D/AU
E2             1      MEYERS ZUM BUESCHENFELDE K H M/AU
E3             0 --> MEYERS, K/AU
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E5             7      MEYERSBACH P/AU
E6             2      MEYERSBACH PETER/AU
E7             1      MEYERSBER G/AU
E8             7      MEYERSBERG G/AU
E9             6      MEYERSBERG GUSTAV/AU
E10            2      MEYERSBERG GUSTAVE/AU
E11            3      MEYERSBERG H/AU
E12            2      MEYERSBERG HEINZ/AU

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     FILE 'MEDLINE, BIOSIS, WPIDS, FSTA, EMBASE, JAPIO, DGENE, HCAPLUS,
     USPATFULL' ENTERED AT 18:45:27 ON 25 AUG 2004
L1            73 S RECRYSTALLIZATION WITH INHIBITION
L2           231 S THERMAL HYSTERESIS PROTEIN
L3             6 S L2 AND L1
                 E HORWATH, K/AU
                 E MEYERS, K/AU
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 NEWS  4  May 12   Polymer links for the POLYLINK command completed in REGISTRY
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                                                           ENTRY    SESSION
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=> s thermal hysteresis protein
L2          231 THERMAL HYSTERESIS PROTEIN

=> s l2 and l1
L3            6 L2 AND L1

=> d l3 ti abs ibib tot

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     (designated Tm 12.86), and an additional endogenous activating factor of
     this antifreeze protein; 2) the ability to track the cellular and
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     and, 4) a means of quantifying RI behavior of purified Tm 12.86, and
     samples of unknown concentrations of THPs, to provide a more sensitive
     detection method for antifreeze activity at scaled down values associated
     with the in vitro system.  In combination, these studies indicate that the
     adaptation mechanisms contributing to the overall antifreeze protein
     response in a cold hardy insect involves a complex interaction between
```

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ACCESSION NUMBER: 1996:538806 BIOSIS
DOCUMENT NUMBER: PREV199699261162
TITLE: Tracking the profile of a specific antifreeze protein and its contribution to the thermal hysteresis activity in cold hardy insects.
AUTHOR(S): Horwath, Kathleen L. [Reprint author]; Easton, Christopher M.; Poggioli., George J., Jr.; Myers, Kevin; Schnorr, Ingrid L.
CORPORATE SOURCE: Dep. Biol. Sci., Binghamton Univ., Binghamton, NY 13902-6000, USA
SOURCE: European Journal of Entomology, (1996) Vol. 93, No. 3, pp. 419-433.
ISSN: 1210-5759.
DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 10 Dec 1996
Last Updated on STN: 10 Dec 1996

L3 ANSWER 2 OF 6 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN
TI New cDNA polynucleotide encoding a **thermal hysteresis protein** which is a Type III anti-freeze protein derived from the Tenebrionoidea Superfamily, useful for providing antifreeze protection to improve the quality of food.
AN 2002-090137 [12] WPIDS
AB WO 200194378 A UPAB: 20020221
NOVELTY - A cDNA polynucleotide (I) comprising a nucleotide sequence for encoding a **thermal hysteresis protein** which is a Type III anti-freeze protein derived from the Tenebrionoidea Superfamily, is new.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are included for the following:

(1) a mRNA polynucleotide (II) comprising a nucleotide sequence for encoding thermal hysteresis proteins derived from the Tenebrionoidea Superfamily transcribed from (I);

(2) a DNA or RNA probe having a sequence complementary or identical to a sequence of contiguous nucleotides for at least a portion of (I);

(3) a recombinant vector containing (I);

(4) a **thermal hysteresis protein**, preferably an endogenous Type III anti-freeze proteins, derived from the Tenebrionoidea Superfamily which lowers the freezing point of a solution without effecting the melting point of the solution;

(5) a consensus sequence with a nucleotide sequence selected from one of the four 481 nucleotide sequences (S1-S4) defined in the specification;

(6) a consensus sequence with an amino acid sequence selected from the 133 (S5), 134 (S6), another 134 (S7), another 134 (S8) amino acid sequence defined in the specification;

(7) a consensus sequence with the 133 amino acid sequence (S9) defined in the specification;

(8) a primer having a nucleotide sequence selected from P1-P3;

(9) a method (M1) for producing a polypeptide having antifreeze properties comprising forming a cloning vector with a Tm 12.86 family member gene encoding an antifreeze polypeptide, transferring genes of the cloning vector into DNA of host cell to create a transformed cell, expressing a mRNA sequence and a translated amino acid sequence from the recombinant expression vector, the sequence being isoforms of the Tm 12.86 T. molitor antifreeze polypeptide;

(10) a method (M2) for providing antifreeze or **recrystallization inhibition** properties to a subject formulation comprising incorporating at least 0.1 micrograms to 1 mg of an

activated polypeptide into 1 ml of a subject formulation to obtain **recrystallization inhibition** or 1 mg to 25 mg of the activated polypeptide into 1 ml of a subject formulation to thermal hysteresis;

(11) a Tm 12.86 antibody/antiserum;

(12) a **recrystallization inhibition** method (M3) for determining the presence, relative concentration, and/or activity of thermal hysteresis proteins comprising providing a proteinaceous composition in a solvent to form a test solution, flash freezing the solution, raising the temperature of the frozen solution to an appropriate annealing temperature that allows for a partial melt, while limiting heterogeneity in ice grain sizes within the solution, maintaining the frozen solution at the annealing temperature for a length of time sufficient to allow for recrystallization, monitoring the ice crystal grain size changes over time, and determining the presence of functional thermal hysteresis proteins in the solution given the retention of significantly smaller ice crystal grain sizes relative to at least one control solution;

(13) a method for quantitatively assessing the extent of recrystallization occurring in frozen foods, and the impact of solution additives to inhibit or limit recrystallization according to the process defined in M3; and

(14) a method for quantitatively assessing and comparing the effectiveness of cryoprotective solutions on the extent of recrystallization occurring in cryopreserved cells, tissues, solutions and the like, according to the process defined in M3.

CGCGGATCCCTCACCGACGAACAG (P1);

GAGAGGATAACTAATTGAGCTCGCC (P2); and

CGCGGATCCCTGACCGAGGCACAA (P3).

USE - The activated anti-freeze protein is incorporated into:

(a) plant, produce or fish in an amount sufficient to provide antifreeze protection;

(b) a region of a target tissue in an amount sufficient to provide antifreeze protein controlled limited tumor cell or target tissue cryoinjury during cryosurgery;

(c) hypothermic solutions or bathing media to reduce cold damage in order to provide cryogenic or hypothermic preservation of cells and tissues by incorporating the protein into the cells, tissue, or cell membranes in a controlled amount sufficient to provide antifreeze protection;

(d) de-icing formulations or used on surfaces to reduce existing ice buildup or abate the formation of ice buildup on surfaces such as a road, aircraft, household products, cosmetic products, machinery and plant surfaces; or

(e) a food product in an amount sufficient to provide antifreeze protection to improve the quality of food by abating freezing of solutions, freezer burn, or degradation due to cold storage.

The polynucleotides for the activated protein are used to create transgenic or gene-modified plants, crops, fish, or animals having greater tolerance to cold climatization. The Tm 12.86 antibody/antiserum is used as a screening device to identify positive recombinant plaques containing cloned inserts capable in an expression vector system to produce recombinant products recognized by the antibody/antiserum. The Tm 12.86 antibody/antiserum which is also used as a screening device to screen cDNA libraries in an expression system, including cross-species cDNA libraries to identify homologous sequences in other species.

M3 is used for concurrent multiple sample testing of solutions which includes the 'sandwich' method; and application via a 96 well plate device (all claimed).

Dwg.0/8

ACCESSION NUMBER: 2002-090137 [12] WPIDS

DOC. NO. CPI: C2002-027870

TITLE: New cDNA polynucleotide encoding a **thermal hysteresis protein** which is a Type III

anti-freeze protein derived from the Tenebrionoidea Superfamily, useful for providing antifreeze protection to improve the quality of food.

DERWENT CLASS: C06 D16

INVENTOR(S): HORWATH, K L; MEYERS, K L; EASTON, C M; MYERS, K L

PATENT ASSIGNEE(S): (EAST-I) EASTON C M; (HORW-I) HORWATH K L; (MYER-I) MYERS K L; (UYNY) UNIV NEW YORK STATE RES FOUND; (MEYE-I) MEYERS K L

COUNTRY COUNT: 91

PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG
WO 2001094378	A1	20011213	(200212)*	EN	231
RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZW					
W: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW					
AU 2001075389	A	20011217	(200225)		
US 2002172951	A1	20021121	(200279)		
US 2002173024	A1	20021121	(200279)		

APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
WO 2001094378	A1	WO 2001-US18532	20010607
AU 2001075389	A	AU 2001-75389	20010607
US 2002172951	A1 Provisional	US 2000-210446P	20000608
		US 2001-876348	20010607
US 2002173024	A1 Provisional	US 2000-210446P	20000608
		US 2001-876796	20010607

FILING DETAILS:

PATENT NO	KIND	PATENT NO
AU 2001075389	A Based on	WO 2001094378

PRIORITY APPLN. INFO: US 2000-210446P 20000608; US 2001-876348 20010607; US 2001-876796 20010607

L3 ANSWER 3 OF 6 USPATFULL on STN

TI Nucleic acid sequences encoding type III tenebrio antifreeze proteins and method for assaying activity

AB Thermal hysteresis proteins and their nucleotide sequences derived from the Tenebrionoidea Superfamily which lower the freezing point of a solution without effecting the melting point. Related methods for preparing said proteins and for providing antifreeze or **recrystallization inhibition** properties to a subject formulation.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

ACCESSION NUMBER: 2002:307900 USPATFULL

TITLE: Nucleic acid sequences encoding type III tenebrio antifreeze proteins and method for assaying activity

INVENTOR(S): Horwath, Kathleen L., Endwell, NY, UNITED STATES
Easton, Christopher M., Ithaca, NY, UNITED STATES

NUMBER	KIND	DATE

PATENT INFORMATION: US 2002173024 A1 20021121
APPLICATION INFO.: US 2001-876796 A1 20010607 (9)

	NUMBER	DATE
PRIORITY INFORMATION:	US 2000-210446P	20000608 (60)

DOCUMENT TYPE: Utility
FILE SEGMENT: APPLICATION
LEGAL REPRESENTATIVE: Mark Levy, SALZMAN & LEVY, Ste. 902, 19 Chenango St., Binghamton, NY, 13901
NUMBER OF CLAIMS: 40
EXEMPLARY CLAIM: 1
NUMBER OF DRAWINGS: 131 Drawing Page(s)
LINE COUNT: 10082
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L3 ANSWER 4 OF 6 USPATFULL on STN
TI Nucleic acid sequences encoding type III tenebrio antifreeze proteins and method for assaying activity
AB A **recrystallization inhibition** method for determining the presence, relative concentration, and/or activity of thermal hysteresis proteins comprising: providing a proteinaceous composition in a solvent to form a test solution; flash freezing said solution; raising the temperature of the frozen solution to an appropriate annealing temperature that allows for a partial melt, while limiting heterogeneity in ice grain sizes within said solution; maintaining said frozen solution at the annealing temperature for a length of time sufficient to allow for recrystallization; monitoring the ice crystal grain size changes over time; and determining the presence of functional thermal hysteresis proteins in said solution given the retention of significantly smaller ice crystal grain sizes relative to at least one control solution.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
ACCESSION NUMBER: 2002:307828 USPATFULL
TITLE: Nucleic acid sequences encoding type III tenebrio antifreeze proteins and method for assaying activity
INVENTOR(S): Horwath, Kathleen L., Endwell, NY, UNITED STATES
Meyers, Kevin L., Trumansburg, NY, UNITED STATES

	NUMBER	KIND	DATE
PATENT INFORMATION:	US 2002172951	A1	20021121
APPLICATION INFO.:	US 2001-876348	A1	20010607 (9)

	NUMBER	DATE
PRIORITY INFORMATION:	US 2000-210446P	20000608 (60)

DOCUMENT TYPE: Utility
FILE SEGMENT: APPLICATION
LEGAL REPRESENTATIVE: Mark Levy, SALZMAN & LEVY, Ste. 902, 19 Chenango St., Binghamton, NY, 13901
NUMBER OF CLAIMS: 34
EXEMPLARY CLAIM: 1
NUMBER OF DRAWINGS: 131 Drawing Page(s)
LINE COUNT: 10121
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L3 ANSWER 5 OF 6 USPATFULL on STN
TI Transgenic plants having a nucleic acid sequence encoding a dendroides antifreeze protein
AB The present invention is directed to transgenic plants having nucleic acid sequences encoding Dendroides canadensis thermal hysteresis proteins. The THPs of Dendroides have significantly greater thermal

hysteresis activity than any other known anti-freeze protein. The thermal hysteresis activity of the purified THPs can be further enhanced by combining the THPs with various "activating" compounds.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

ACCESSION NUMBER:	97:45207 USPATFULL
TITLE:	Transgenic plants having a nucleic acid sequence encoding a dendroides antifreeze protein
INVENTOR(S):	Duman, John G., South Bend, IN, United States
PATENT ASSIGNEE(S):	University of Notre Dame du Lac, Notre Dame, IN, United States (U.S. corporation)

	NUMBER	KIND	DATE
PATENT INFORMATION:	US 5633451		19970527
APPLICATION INFO.:	US 1995-569594		19951208 (8)
RELATED APPLN. INFO.:	Division of Ser. No. US 1995-485359, filed on 7 Jun 1995		

DOCUMENT TYPE:	Utility
FILE SEGMENT:	Granted
PRIMARY EXAMINER:	Fox, David T.
ASSISTANT EXAMINER:	Haas, Thomas
LEGAL REPRESENTATIVE:	Barnes & Thornburg
NUMBER OF CLAIMS:	1
EXEMPLARY CLAIM:	1
NUMBER OF DRAWINGS:	9 Drawing Figure(s); 5 Drawing Page(s)
LINE COUNT:	966

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L3 ANSWER 6 OF 6 USPATFULL on STN

TI Nucleic acid sequences encoding dendroides antifreeze proteins

AB The present invention is directed to nucleic acid sequences encoding Dendroides canadensis thermal hysteresis proteins. The THPs of Dendroides have significantly greater thermal hysteresis activity than any other known anti-freeze protein. The thermal hysteresis activity of the purified THPs can be further enhanced by combining the THPs with various "activating" compounds.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

ACCESSION NUMBER:	97:38394 USPATFULL
TITLE:	Nucleic acid sequences encoding dendroides antifreeze proteins
INVENTOR(S):	Duman, John G., South Bend, IN, United States
PATENT ASSIGNEE(S):	University of Notre Dame du Lac, Notre Dame, IN, United States (U.S. corporation)

	NUMBER	KIND	DATE
PATENT INFORMATION:	US 5627051		19970506
APPLICATION INFO.:	US 1995-485359		19950607 (8)

DOCUMENT TYPE:	Utility
FILE SEGMENT:	Granted
PRIMARY EXAMINER:	Jacobson, Dian C.
ASSISTANT EXAMINER:	Lau, Kawai
LEGAL REPRESENTATIVE:	Barnes & Thornburg
NUMBER OF CLAIMS:	4
EXEMPLARY CLAIM:	1
NUMBER OF DRAWINGS:	9 Drawing Figure(s); 5 Drawing Page(s)
LINE COUNT:	959

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

=> e horwath, k/au

E1 18 HORWATH WINTER J/AU

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E2          14      HORWATH WINTER JUTTA/AU
E3           0 --> HORWATH, K/AU
E4           1      HORWATITISCH H/AU
E5          23      HORWATITSCH H/AU
E6          17      HORWATITSCH HEINZ/AU
E7           3      HORWATT BOZYCZKO E/AU
E8           8      HORWATT E/AU
E9           1      HORWATT EWA/AU
E10          3      HORWATT K/AU
E11          2      HORWATT P M/AU
E12          2      HORWATT PETER M/AU

=> e meyers, k/au
E1           1      MEYERS ZU HERINGDORF D/AU
E2           1      MEYERS ZUM BUESCHENFELDE K H M/AU
E3           0 --> MEYERS, K/AU
E4           1      MEYERSANTA A C C/AU
E5           7      MEYERSBACH P/AU
E6           2      MEYERSBACH PETER/AU
E7           1      MEYERSBER G/AU
E8           7      MEYERSBERG G/AU
E9           6      MEYERSBERG GUSTAV/AU
E10          2      MEYERSBERG GUSTAVE/AU
E11          3      MEYERSBERG H/AU
E12          2      MEYERSBERG HEINZ/AU

=> d his

     (FILE 'HOME' ENTERED AT 18:44:47 ON 25 AUG 2004)

     FILE 'MEDLINE, BIOSIS, WPIDS, FSTA, EMBASE, JAPIO, DGENE, HCAPLUS,
     USPATFULL' ENTERED AT 18:45:27 ON 25 AUG 2004
L1           73 S RECRYSTALLIZATION WITH INHIBITION
L2          231 S THERMAL HYSTERESIS PROTEIN
L3            6 S L2 AND L1
                E HORWATH, K/AU
                E MEYERS, K/AU

=> d l1 ti abs ibib 1-20
<------User Break------>

=> d his

     (FILE 'HOME' ENTERED AT 18:44:47 ON 25 AUG 2004)

     FILE 'MEDLINE, BIOSIS, WPIDS, FSTA, EMBASE, JAPIO, DGENE, HCAPLUS,
     USPATFULL' ENTERED AT 18:45:27 ON 25 AUG 2004
L1           73 S RECRYSTALLIZATION WITH INHIBITION
L2          231 S THERMAL HYSTERESIS PROTEIN
L3            6 S L2 AND L1
                E HORWATH, K/AU
                E MEYERS, K/AU

=> d l1 ti abs ibib 1-20

L1   ANSWER 1 OF 73     MEDLINE on STN
TI   Demonstration of antifreeze protein activity in Antarctic lake bacteria.
AB   Antifreeze proteins (AFPs) are a structurally diverse group of proteins
     that have the ability to modify ice crystal structure and inhibit
     recrystallization of ice.  AFPs are well characterized in fish and
     insects, but very few bacterial species have been shown to have AFP
     activity to date.  Thirty eight freshwater to hypersaline lakes in the
     Vestfold Hills and Larsemann Hills of Eastern Antarctica were sampled for
     AFPs during 2000.  Eight hundred and sixty six bacterial isolates were
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cultivated. A novel AFP assay, designed for high-throughput analysis in Antarctica, demonstrated putative activity in 187 of the cultures. Subsequent analysis of the putative positive isolates showed 19 isolates with significant **recrystallization inhibition** (RI) activity. The 19 RI active isolates were characterized using ARDRA (amplified rDNA restriction analysis) and 16S rDNA sequencing. They belong to genera from the alpha- and gamma-Proteobacteria, with genera from the gamma-subdivision being predominant. The 19 AFP-active isolates were isolated from four physico-chemically diverse lakes. Ace Lake and Oval Lake were both meromictic with correspondingly characteristic chemically stratified water columns. Pendant Lake was a saline holomictic lake with different chemical properties to the two meromictic lakes. Triple Lake was a hypersaline lake rich in dissolved organic carbon and inorganic nutrients. The environments from which the AFP-active isolates were isolated are remarkably diverse. It will be of interest, therefore, to elucidate the evolutionary forces that have led to the acquisition of functional AFP activity in microbes of the Vestfold Hills lakes and to discover the role the antifreezes play in these organisms.

ACCESSION NUMBER: 2004006147 MEDLINE
DOCUMENT NUMBER: PubMed ID: 14702410
TITLE: Demonstration of antifreeze protein activity in Antarctic lake bacteria.
AUTHOR: Gilbert Jack A; Hill Philip J; Dodd Christine E R; Laybourn-Parry Johanna
CORPORATE SOURCE: Division of Food Sciences, School of Biosciences, University of Nottingham, Sutton Bonington Campus, Loughborough, Leicestershire LE12 5RD, UK.. gilbertj@post.queensu.ca
SOURCE: Microbiology (Reading, England), (2004 Jan) 150 (Pt 1) 171-80.
Journal code: 9430468. ISSN: 1350-0872.
PUB. COUNTRY: England: United Kingdom
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
OTHER SOURCE: GENBANK-AY092065; GENBANK-AY092066; GENBANK-AY092067; GENBANK-AY092068; GENBANK-AY092069; GENBANK-AY092070; GENBANK-AY092071; GENBANK-AY092072; GENBANK-AY092073; GENBANK-AY092074; GENBANK-AY092075; GENBANK-AY092076; GENBANK-AY092077; GENBANK-AY092078; GENBANK-AY092079; GENBANK-AY092080
ENTRY MONTH: 200404
ENTRY DATE: Entered STN: 20040106
Last Updated on STN: 20040407
Entered Medline: 20040406

L1 ANSWER 2 OF 73 MEDLINE on STN
TI A facile method for determining ice **recrystallization inhibition** by antifreeze proteins.
AB Ice recrystallization, the growth of large ice crystals at the expense of small ones, stresses freeze tolerant organisms and causes spoilage of frozen foods. This process is inhibited by antifreeze proteins (AFPs). Here, we present a simple method for determining the ice **recrystallization inhibition** (RI) activity of an AFP under physiological conditions using 10microl glass capillaries. Serial dilutions were prepared to determine the concentration below which RI activity was no longer detected, termed the RI endpoint. For type III AFP this was 200nM. The capillary method allows samples to be aligned and viewed simultaneously, which facilitates RI endpoint determination. Once prepared, the samples can be used reproducibly in subsequent RI assays and can be archived in a freezer for future reference. This method was used to detect the elution of type III AFP from a Sephadex G-75 size-exclusion column. RI activity was found at the expected V(e) for a 7kDa protein and also unexpectedly in the void volume.

ACCESSION NUMBER: 2003543488 MEDLINE
DOCUMENT NUMBER: PubMed ID: 14623287
TITLE: A facile method for determining ice **recrystallization inhibition** by antifreeze proteins.
AUTHOR: Tomczak Melanie M; Marshall Christopher B; Gilbert Jack A; Davies Peter L
CORPORATE SOURCE: Department of Biochemistry and the Protein Engineering Network of Centres of Excellence, Queen's University, Ont., K7L 3N6, Kingston, Canada.
SOURCE: Biochemical and biophysical research communications, (2003 Nov 28) 311 (4) 1041-6.. Journal code: 0372516. ISSN: 0006-291X.
PUB. COUNTRY: United States
DOCUMENT TYPE: (EVALUATION STUDIES) Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 200402
ENTRY DATE: Entered STN: 20031119 Last Updated on STN: 20040210 Entered Medline: 20040209

L1 ANSWER 3 OF 73 MEDLINE on STN
TI A serendipitous discovery of antifreeze protein-specific activity in C-linked antifreeze glycoprotein analogs.
AB Structurally diverse carbon-linked (C-linked) analogs of antifreeze glycoprotein (AFGP) have been prepared via linear or convergent solid phase synthesis. These analogs range in molecular weight from approx 1.5-4.1 KDa and do not possess the beta-D-galactose-1,3-alpha-D-N-acetylgalactosamine carbohydrate moiety or the L-threonine-L-alanine-L-alanine polypeptide backbone native to the AFGP wild-type. Despite these dramatic structural modifications, the 2.7-KDa and 4.1-KDa analogs possess antifreeze protein-specific activity as determined by **recrystallization-inhibition** (RI) and thermal hysteresis (TH) assays. These analogs are weaker than the wild-type in their activity, but nanoliter osmometry indicates that these compounds are binding to ice and affecting a localized freezing point depression. This is the first example of a C-linked AFGP analog that possesses TH and RI activity and suggests that the rational design and synthesis of chemically and biologically stable AFGP analogs is a feasible and worthwhile endeavor. Given the low degree of TH activity, these compounds may prove useful for the protection of cells during freezing and thawing cycles.
ACCESSION NUMBER: 2003253825 MEDLINE
DOCUMENT NUMBER: PubMed ID: 12777711
TITLE: A serendipitous discovery of antifreeze protein-specific activity in C-linked antifreeze glycoprotein analogs.
AUTHOR: Eniade Adewale; Purushotham Madhusudhan; Ben Robert N; Wang J B; Horwath Kathleen
CORPORATE SOURCE: Department of Chemistry, State University of New York at Binghamton, Binghamton, NY 13902, USA.
CONTRACT NUMBER: GM60319 (NIGMS)
SOURCE: Cell biochemistry and biophysics, (2003) 38 (2) 115-24. Journal code: 9701934. ISSN: 1085-9195.
PUB. COUNTRY: United States
DOCUMENT TYPE: (EVALUATION STUDIES) Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 200401
ENTRY DATE: Entered STN: 20030603 Last Updated on STN: 20040110 Entered Medline: 20040109

L1 ANSWER 4 OF 73 MEDLINE on STN
TI Ice binding, **recrystallization inhibition**, and cryoprotective properties of ice-active substances associated with Antarctic sea ice diatoms.
AB Extracellular macromolecules associated with Antarctic sea ice diatoms were previously shown to have ice-binding activities. The function of these ice-active substances (IASs) has not been identified. Here we show that two of the IASs have a strong ability to inhibit the recrystallization of ice, possibly signifying a cryoprotectant function. To test this possibility, two species of marine diatom (one Antarctic and one temperate) were subjected to a single freeze-thaw cycle (approximately 20h at -4 or -5 degrees C) in the presence or absence of IAS. Viability, based on a double staining technique, was 15-29% higher in the presence of IAS. Etching of single crystal ice hemispheres grown from dilute IAS solutions indicated that the IASs bind to specific faces of ice and are incorporated into the ice lattice. Together, these results suggest that the IASs acts as a cryoprotectant, probably through some ice-binding mechanism.
ACCESSION NUMBER: 2003168594 MEDLINE
DOCUMENT NUMBER: PubMed ID: 12686207
TITLE: Ice binding, **recrystallization inhibition**, and cryoprotective properties of ice-active substances associated with Antarctic sea ice diatoms.
AUTHOR: Raymond James A; Knight Charles A
CORPORATE SOURCE: Department of Biological Sciences, University of Nevada, 4505 Maryland Pkwy S., Las Vegas, NV 89154, USA.. raymond@unlv.edu
SOURCE: Cryobiology, (2003 Apr) 46 (2) 174-81.
Journal code: 0006252. ISSN: 0011-2240.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 200312
ENTRY DATE: Entered STN: 20030416
Last Updated on STN: 20031216
Entered Medline: 20031215

L1 ANSWER 5 OF 73 MEDLINE on STN
TI The physico-chemical characterization of a boiling stable antifreeze protein from a perennial grass (Lolium perenne).
AB We have characterized a cold-induced, boiling stable antifreeze protein. This highly active ice **recrystallization inhibition** protein shows a much lower thermal hysteresis effect and displays binding behavior that is uncharacteristic of any AFP from fish or insects. Ice-binding studies show it binds to the (1 0 1 0) plane of ice and FTIR studies reveal that it has an unusual type of highly beta-sheeted secondary structure. Ice-binding studies of both glycosylated and nonglycosylated expressed forms indicate that it adsorbs to ice through the protein backbone. These results are discussed in light of the currently proposed mechanisms of AFP action.
ACCESSION NUMBER: 2003063106 MEDLINE
DOCUMENT NUMBER: PubMed ID: 12573283
TITLE: The physico-chemical characterization of a boiling stable antifreeze protein from a perennial grass (Lolium perenne).
AUTHOR: Pudney P D A; Buckley S L; Sidebottom C M; Twigg S N; Sevilla M-P; Holt C B; Roper David; Telford J H; McArthur A J; Lillford P J
CORPORATE SOURCE: Unilever Research, Colworth House, Sharnbrook, Bedford MK44 1LQ, UK.. Paul.Pudney@unilever.com
SOURCE: Archives of biochemistry and biophysics, (2003 Feb 15) 410 (2) 238-45.
Journal code: 0372430. ISSN: 0003-9861.
PUB. COUNTRY: United States

DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 200303
ENTRY DATE: Entered STN: 20030208
Last Updated on STN: 20030327
Entered Medline: 20030326

L1 ANSWER 6 OF 73 MEDLINE on STN
TI The response of Anisakis larvae to freezing.
AB Anisakis third stage larvae utilize a variety of fish as intermediate hosts. Uncooked fish are rendered safe for human consumption by freezing. Larvae freeze by inoculative freezing from the surrounding medium but can survive freezing at temperatures down to -10 degrees C. This ability may be aided by the production of trehalose, which can act as a cryoprotectant, but does not involve **recrystallization inhibition**. Monitoring of fish freezing in commercial blast freezers and under conditions which simulate those of a domestic freezer, indicate that it can take a long time for all parts of the fish to reach a temperature that will kill the larvae. This, and the moderate freezing tolerance of larvae, emphasizes the need for fish to be frozen at a low enough temperature and for a sufficient time to ensure that fish are safe for consumption.
ACCESSION NUMBER: 2002735609 MEDLINE
DOCUMENT NUMBER: PubMed ID: 12498643
TITLE: The response of Anisakis larvae to freezing.
AUTHOR: Wharton D A; Aalders O
CORPORATE SOURCE: Department of Zoology, University of Otago, PO Box 56, Dunedin, New Zealand.. david.wharton@stonebow.otago.ac.nz
SOURCE: Journal of helminthology, (2002 Dec) 76 (4) 363-8. Journal code: 2985115R. ISSN: 0022-149X.
PUB. COUNTRY: England: United Kingdom
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 200301
ENTRY DATE: Entered STN: 20021227
Last Updated on STN: 20030124
Entered Medline: 20030123

L1 ANSWER 7 OF 73 MEDLINE on STN
TI Semipurification and ice **recrystallization inhibition** activity of ice-active substances associated with Antarctic photosynthetic organisms.
AB Ice-active substances (IASs), i.e., macromolecular substances that modify the shape of growing ice crystals, were previously found to be associated with various terrestrial and aquatic photosynthetic organisms from Antarctica, but their chemical nature and function are unknown. In this study, we used the ice-binding properties of the IASs to semipurify IASs from a cyanobacterial mat, a eukaryotic green alga (Prasiola sp.), and a moss (Bryum sp.) and examined the ice **recrystallization inhibition** (RI) activities of the semipure materials. The semipure materials contain both protein and carbohydrate in which the carbohydrate accounted for 73, 52, and 37%, respectively, of the total carbohydrate + protein. The IASs had RI activity at concentrations of 1.4, 0.05, and 0.01 microg ml-1, respectively. RI activity was greatly reduced by heat treatment, suggesting that the IASs inhibit recrystallization through a specific interaction with ice. These results raise the possibility that the IASs increase freezing tolerance of their respective organisms by preventing the recrystallization of ice.

ACCESSION NUMBER: 2002135927 MEDLINE
DOCUMENT NUMBER: PubMed ID: 11812052
TITLE: Semipurification and ice **recrystallization**

inhibition activity of ice-active substances associated with Antarctic photosynthetic organisms.
AUTHOR: Raymond J A; Fritsen C H
CORPORATE SOURCE: Department of Biological Sciences, University of Nevada, Las Vegas, Nevada 89154, USA.. raymond@unlv.edu
SOURCE: Cryobiology, (2001 Aug) 43 (1) 63-70.
Journal code: 0006252. ISSN: 0011-2240.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 200204
ENTRY DATE: Entered STN: 20020302
Last Updated on STN: 20020413
Entered Medline: 20020412

L1 ANSWER 8 OF 73 MEDLINE on STN
TI A theoretical model of a plant antifreeze protein from Lolium perenne.
AB Antifreeze proteins (AFPs), found in certain organisms enduring freezing environments, have the ability to inhibit damaging ice crystal growth. Recently, the repetitive primary sequence of the AFP of perennial ryegrass, Lolium perenne, was reported. This macromolecular antifreeze has high ice **recrystallization inhibition** activity but relatively low thermal hysteresis activity. We present here a theoretical three-dimensional model of this 118-residue plant protein based on a beta-roll domain with eight loops of 14-15 amino acids. The fold is supported by a conserved valine hydrophobic core and internal asparagine ladders at either end of the roll. Our model, which is the first proposed for a plant AFP, displays two putative, opposite-facing, ice-binding sites with surface complementarity to the prism face of ice. The juxtaposition of the two imperfect ice-binding surfaces suggests an explanation for the protein's inferior thermal hysteresis but superior ice **recrystallization inhibition** activity and activity when compared with fish and insect AFPs.
ACCESSION NUMBER: 2001674827 MEDLINE
DOCUMENT NUMBER: PubMed ID: 11721016
TITLE: A theoretical model of a plant antifreeze protein from Lolium perenne.
AUTHOR: Kuiper M J; Davies P L; Walker V K
CORPORATE SOURCE: Department of Biology, Queen's University, Kingston, Ontario K7L 3N6, Canada.
SOURCE: Biophysical journal, (2001 Dec) 81 (6) 3560-5.
Journal code: 0370626. ISSN: 0006-3495.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 200201
ENTRY DATE: Entered STN: 20011127
Last Updated on STN: 20020125
Entered Medline: 20020122

L1 ANSWER 9 OF 73 MEDLINE on STN
TI Antifreeze and ice nucleator proteins in terrestrial arthropods.
AB Terrestrial arthropods survive subzero temperatures by becoming either freeze tolerant (survive body fluid freezing) or freeze avoiding (prevent body fluid freezing). Protein ice nucleators (PINs), which limit supercooling and induce freezing, and antifreeze proteins (AFPs), which function to prevent freezing, can have roles in both freeze tolerance and avoidance. Many freeze-tolerant insects produce hemolymph PINs, which induce freezing at high subzero temperatures thereby inhibiting lethal intracellular freezing. Some freeze-tolerant species have AFPs that function as cryoprotectants to prevent freeze damage. Although the mechanism of this cryoprotection is not known, it may involve

recrystallization inhibition and perhaps stabilization of the cell membrane. Freeze-avoiding species must prevent inoculative freezing initiated by external ice across the cuticle and extend supercooling abilities. Some insects remove PINs in the winter to promote supercooling, whereas others have selected against surfaces with ice-nucleating abilities on an evolutionary time scale. However, many freeze-avoiding species do have proteins with ice-nucleating activity, and these proteins must be masked in winter. In the beetle Dendroides canadensis, AFPs in the hemolymph and gut inhibit ice nucleators. Also, hemolymph AFPs and those associated with the layer of epidermal cells under the cuticle inhibit inoculative freezing. Two different insect AFPs have been characterized. One type from the beetles D. canadensis and Tenebrio molitor consists of 12- and 13-mer repeating units with disulfide bridges occurring at least every six residues. The spruce budworm AFP lacks regular repeat units. Both have much higher activities than any known AFPs.

ACCESSION NUMBER: 2001338023 MEDLINE
DOCUMENT NUMBER: PubMed ID: 11181959
TITLE: Antifreeze and ice nucleator proteins in terrestrial arthropods.
AUTHOR: Duman J G
CORPORATE SOURCE: Department of Biological Sciences, University of Notre Dame, Notre Dame, Indiana 46556, USA.. duman.1@nd.edu
SOURCE: Annual review of physiology, (2001) 63 327-57. Ref: 145
Journal code: 0370600. ISSN: 0066-4278.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
General Review; (REVIEW)
(REVIEW LITERATURE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 200106
ENTRY DATE: Entered STN: 20010618
Last Updated on STN: 20010618
Entered Medline: 20010614

L1 ANSWER 10 OF 73 MEDLINE on STN
TI Stable, high-level expression of a type I antifreeze protein in Escherichia coli.
AB The type I antifreeze proteins are simple amphipathic helical proteins found in abundance in polar fish species, where they act to prevent freezing of internal fluids by a mechanism of noncolligative freezing point depression. Large-scale production of these proteins for research and biotechnological purposes has been hampered by their apparent instability when expressed in heterologous host systems. This has necessitated their production as fusion proteins, in polymeric form, or as proproteins for secretion, with the concomitant necessity for postpurification processing to generate the mature form of the protein. We have successfully expressed a recombinant variant of type I antifreeze protein (rAFP) in Escherichia coli using the inducible T7 polymerase transcription expression system. The rAFP contains five copies of the 11 amino acid ice-binding repeat motif found in all type I antifreeze proteins. The protein accumulates to high levels intracellularly in the form of inclusion bodies, with no apparent degradation by the cellular proteolytic machinery. We have devised a simple and rapid purification protocol for this recombinant type I antifreeze protein which does not require cellular fractionation, purification of the inclusion bodies, or chromatographic steps. This protocol may be of general use for this class of protein. The protein displays all three activities common to these proteins: **recrystallization inhibition**, noncolligative freezing point depression, and modification of the morphology of single ice crystals in solution.

ACCESSION NUMBER: 1999288213 MEDLINE
DOCUMENT NUMBER: PubMed ID: 10336860

TITLE: Stable, high-level expression of a type I antifreeze protein in Escherichia coli.
AUTHOR: Solomon R G; Appels R
CORPORATE SOURCE: CSIRO Plant Industry and Quality Wheat CRC Ltd, Canberra, ACT, 2601, Australia.
SOURCE: Protein expression and purification, (1999 Jun) 16 (1) 53-62.
Journal code: 9101496. ISSN: 1046-5928.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 199907
ENTRY DATE: Entered STN: 19990727
Last Updated on STN: 19990727
Entered Medline: 19990712

L1 ANSWER 11 OF 73 MEDLINE on STN
TI Recrystallization in a freezing tolerant Antarctic nematode, Panagrolaimus davidi, and an alpine weta, Hemideina maori (Orthoptera; Stenopelmatidae).
AB The ability of haemolymph from the freezing tolerant weta, Hemideina maori, and supernatant from homogenates of the freezing tolerant nematode Panagrolaimus davidi to inhibit the recrystallization of ice was examined using the "splat freezing" technique and annealing on a cryomicroscope stage. There was no **recrystallization inhibition** in weta haemolymph or in insect ringer controls. **Recrystallization inhibition** was present in the nematode supernatant but this was destroyed by heating and was absent in controls. P. davidi survives intracellular freezing and **recrystallization inhibition** may be important for the survival of this stress.
ACCESSION NUMBER: 97130895 MEDLINE
DOCUMENT NUMBER: PubMed ID: 8975688
TITLE: Recrystallization in a freezing tolerant Antarctic nematode, Panagrolaimus davidi, and an alpine weta, Hemideina maori (Orthoptera; Stenopelmatidae).
AUTHOR: Ramlov H; Wharton D A; Wilson P W
CORPORATE SOURCE: Roskilde University Center, Institute of Biology and Chemistry, Denmark.
SOURCE: Cryobiology, (1996 Dec) 33 (6) 607-13.
Journal code: 0006252. ISSN: 0011-2240.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 199701
ENTRY DATE: Entered STN: 19970219
Last Updated on STN: 19970219
Entered Medline: 19970128

L1 ANSWER 12 OF 73 MEDLINE on STN
TI Nonequilibrium antifreeze peptides and the recrystallization of ice.
AB Evidence is presented that the nonequilibrium antifreeze peptide (AFP) from winter flounder has a special ability to inhibit recrystallization in ice only when an appreciable amount of liquid is present, as is the case when the system contains salts and the temperature is not too low. In this circumstance the AFP binds to the ice surface at the ice-solution interfaces in grain boundaries, preventing migration of the solution and effectively immobilizing the boundaries. In the absence of liquid, **recrystallization inhibition** appears to be a common property of many peptides. This is consistent with the view that the special effects of AFPs require a structural fit onto ice, and therefore require the AFP molecules to have the mobility to achieve that fit. Since the concentration of salt required to induce the special **recrystallization inhibition** effects of AFPs is lower (<

10 mM) than that found normally in physiological fluids, AFPs could play a role in the survival of organisms by preventing damage due to recrystallization. The proposition that mobility is needed for AFP molecules to produce their special influence upon ice growth argues against any special effects of AFPs in devitrification.

ACCESSION NUMBER: 95212140 MEDLINE
DOCUMENT NUMBER: PubMed ID: 7697996
TITLE: Nonequilibrium antifreeze peptides and the recrystallization of ice.
AUTHOR: Knight C A; Wen D; Laursen R A
CORPORATE SOURCE: National Center for Atmospheric Research, Boulder, Colorado 80307.
SOURCE: Cryobiology, (1995 Feb) 32 (1) 23-34.
Journal code: 0006252. ISSN: 0011-2240.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 199505
ENTRY DATE: Entered STN: 19950510
Last Updated on STN: 19950510
Entered Medline: 19950503

L1 ANSWER 13 OF 73 MEDLINE on STN
TI Plant thermal hysteresis proteins.
AB Proteins which produce a thermal hysteresis (i.e. lower the freezing point of water below the melting point) are common antifreezes in cold adapted poikilothermic animals, especially fishes from ice-laden seas and terrestrial arthropods. However, these proteins have not been previously identified in plants. 16 species of plants collected from northern Indiana in autumn and winter had low levels of thermal hysteresis activity, but activity was absent in summer. This suggests that thermal hysteresis proteins may be a fairly common winter adaptation in angiosperms. Winter stem fluid from the bittersweet nightshade, Solanum dulcamara L., also showed the **recrystallization inhibition** activity characteristic of the animal thermal hysteresis proteins (THPs), suggesting a possible function for the THPs in this freeze tolerant species. Other potential functions are discussed. Antibodies to an insect THP cross reacted on immunoelectroblots with proteins in S. dulcamara stem fluid, indicating common epitopes in the insect and plant THPs.

ACCESSION NUMBER: 92287951 MEDLINE
DOCUMENT NUMBER: PubMed ID: 1599942
TITLE: Plant thermal hysteresis proteins.
AUTHOR: Urrutia M E; Duman J G; Knight C A
CORPORATE SOURCE: Department of Biological Sciences, University of Notre Dame, IN 46556.
SOURCE: Biochimica et biophysica acta, (1992 May 22) 1121 (1-2) 199-206.
Journal code: 0217513. ISSN: 0006-3002.
PUB. COUNTRY: Netherlands
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 199207
ENTRY DATE: Entered STN: 19920724
Last Updated on STN: 19920724
Entered Medline: 19920714

L1 ANSWER 14 OF 73 MEDLINE on STN
TI Expression of antifreeze proteins in transgenic plants.
AB The quality of frozen fruits and vegetables can be compromised by the damaging effects of ice crystal growth within the frozen tissue. Antifreeze proteins in the blood of some polar fishes have been shown to

inhibit ice recrystallization at low concentrations. In order to determine whether expression of genes of this type confers improved freezing properties to plant tissue, we have produced transgenic tobacco and tomato plants which express genes encoding antifreeze proteins. The afa3 antifreeze gene was expressed at high steady-state mRNA levels in leaves from transformed plants, but we did not detect inhibition of ice recrystallization in tissue extracts. However, both mRNA and fusion proteins were detectable in transgenic tomato tissue containing a chimeric gene encoding a fusion protein truncated staphylococcal protein A and antifreeze protein. Furthermore, ice **recrystallization inhibition** was detected in this transgenic tissue.

ACCESSION NUMBER: 92032761 MEDLINE
DOCUMENT NUMBER: PubMed ID: 1932678
TITLE: Expression of antifreeze proteins in transgenic plants.
AUTHOR: Hightower R; Baden C; Penzes E; Lund P; Dunsmuir P
CORPORATE SOURCE: DNA Plant Technology Corporation, Oakland, CA 94608.
SOURCE: Plant molecular biology, (1991 Nov) 17 (5) 1013-21.
Journal code: 9106343. ISSN: 0167-4412.
PUB. COUNTRY: Netherlands
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 199111
ENTRY DATE: Entered STN: 19920124
Last Updated on STN: 19920124
Entered Medline: 19911125

L1 ANSWER 15 OF 73 MEDLINE on STN
TI Solute effects on ice recrystallization: an assessment technique.
AB Reliable assessment of the effect of a solute upon ice recrystallization is accomplished with "splat cooling," the impaction of a small solution droplet onto a very cold metal plate. The ice disc has extremely small crystals, and recrystallization can be followed without confusing effects caused by grain nucleation. This method confirms the exceptionally strong **recrystallization inhibition** effect of antifreeze protein from Antarctic fish and shows that grain growth rate is a sensitive function of both grain size and solute concentration.

ACCESSION NUMBER: 88166054 MEDLINE
DOCUMENT NUMBER: PubMed ID: 3349811
TITLE: Solute effects on ice recrystallization: an assessment technique.
AUTHOR: Knight C A; Hallett J; DeVries A L
CORPORATE SOURCE: National Center for Atmospheric Research, Boulder, Colorado 80307.
SOURCE: Cryobiology, (1988 Feb) 25 (1) 55-60.
Journal code: 0006252. ISSN: 0011-2240.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 198804
ENTRY DATE: Entered STN: 19900308
Last Updated on STN: 19900308
Entered Medline: 19880428

L1 ANSWER 16 OF 73 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
TI Demonstration of antifreeze protein activity in Antarctic lake bacteria.
AB Antifreeze proteins (AFPs) are a structurally diverse group of proteins that have the ability to modify ice crystal structure and inhibit recrystallization of ice. AFPs are well characterized in fish and insects, but very few bacterial species have been shown to have AFP activity to date. Thirty eight freshwater to hypersaline lakes in the Vestfold Hills and Larsemann Hills of Eastern Antarctica were sampled for AFPs during 2000. Eight hundred and sixty six bacterial isolates were

cultivated. A novel AFP assay, designed for high-throughput analysis in Antarctica, demonstrated putative activity in 187 of the cultures. Subsequent analysis of the putative positive isolates showed 19 isolates with significant **recrystallization inhibition** (RI) activity. The 19 RI active isolates were characterized using ARDRA (amplified rDNA restriction analysis) and 16S rDNA sequencing. They belong to genera from the alpha- and gamma-Proteobacteria, with genera from the gamma-subdivision being predominant. The 19 AFP-active isolates were isolated from four physico-chemically diverse lakes. Ace Lake and Oval Lake were both meromictic with correspondingly characteristic chemically stratified water columns. Pendant Lake was a saline holomictic lake with different chemical properties to the two meromictic lakes. Triple Lake was a hypersaline lake rich in dissolved organic carbon and inorganic nutrients. The environments from which the AFP-active isolates were isolated are remarkably diverse. It will be of interest, therefore, to elucidate the evolutionary forces that have led to the acquisition of functional AFP activity in microbes of the Vestfold Hills lakes and to discover the role the antifreezes play in these organisms.

ACCESSION NUMBER: 2004:127308 BIOSIS
DOCUMENT NUMBER: PREV200400128860
TITLE: Demonstration of antifreeze protein activity in Antarctic lake bacteria.
AUTHOR(S): Gilbert, Jack A. [Reprint Author]; Hill, Philip J.; Dodd, Christine E. R.; Laybourn-Parry, Johanna
CORPORATE SOURCE: Department of Biochemistry, Queen's University, Kingston, Ontario, K7L 3N6, Canada
gilbertj@post.queensu.ca
SOURCE: Microbiology (Reading), (January 2004) Vol. 150, No. 1, pp. 171-180. print.
ISSN: 1350-0872 (ISSN print).
DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 3 Mar 2004
Last Updated on STN: 3 Mar 2004

L1 ANSWER 17 OF 73 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
TI A facile method for determining ice **recrystallization inhibition** by antifreeze proteins.
AB Ice recrystallization, the growth of large ice crystals at the expense of small ones, stresses freeze tolerant organisms and causes spoilage of frozen foods. This process is inhibited by antifreeze proteins (AFPs). Here, we present a simple method for determining the ice **recrystallization inhibition** (RI) activity of an AFP under physiological conditions using 10 mul glass capillaries. Serial dilutions were prepared to determine the concentration below which RI activity was no longer detected, termed the RI endpoint. For type III AFP this was 200 nM. The capillary method allows samples to be aligned and viewed simultaneously, which facilitates RI endpoint determination. Once prepared, the samples can be used reproducibly in subsequent RI assays and can be archived in a freezer for future reference. This method was used to detect the elution of type III AFP from a Sephadex G-75 size-exclusion column. RI activity was found at the expected Ve for a 7 kDa protein and also unexpectedly in the void volume.

ACCESSION NUMBER: 2004:64469 BIOSIS
DOCUMENT NUMBER: PREV200400065777
TITLE: A facile method for determining ice **recrystallization inhibition** by antifreeze proteins.
AUTHOR(S): Tomczak, Melanie M.; Marshall, Christopher B.; Gilbert, Jack A.; Davies, Peter L. [Reprint Author]
CORPORATE SOURCE: Department of Biochemistry and Protein Engineering Network of Centres of Excellence, Queens University, Kingston, ON, K7L 3N6, Canada
daviesp@post.queensu.ca

SOURCE: Biochemical and Biophysical Research Communications, (November 28 2003) Vol. 311, No. 4, pp. 1041-1046. print. CODEN: BBRCA9. ISSN: 0006-291X.
DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 28 Jan 2004
Last Updated on STN: 28 Jan 2004

L1 ANSWER 18 OF 73 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
TI A serendipitous discovery of antifreeze protein-specific activity in C-linked antifreeze glycoprotein analogs.
AB Structurally diverse carbon-linked (C-linked) analogs of antifreeze glycoprotein (AFGP) have been prepared via linear or convergent solid phase synthesis. These analogs range in molecular weight from approx 1.5-4.1 KDa and do not possess the beta-D-galactose-1,3-alpha-D-N-acetylgalactosamine carbohydrate moiety or the L-threonine-L-alanine-L-alanine polypeptide backbone native to the AFGP wild-type. Despite these dramatic structural modifications, the 2.7-KDa and 4.1-KDa analogs possess antifreeze protein-specific activity as determined by **recrystallization-inhibition** (RI) and thermal hysteresis (TH) assays. These analogs are weaker than the wild-type in their activity, but nanoliter osmometry indicates that these compounds are binding to ice and affecting a localized freezing point depression. This is the first example of a C-linked AFGP analog that possesses TH and RI activity and suggests that the rational design and synthesis of chemically and biologically stable AFGP analogs is a feasible and worthwhile endeavor. Given the low degree of TH activity, these compounds may prove useful for the protection of cells during freezing and thawing cycles.
ACCESSION NUMBER: 2003:360784 BIOSIS
DOCUMENT NUMBER: PREV200300360784
TITLE: A serendipitous discovery of antifreeze protein-specific activity in C-linked antifreeze glycoprotein analogs.
AUTHOR(S): Eniade, Adewale; Purushotham, Madhusudhan; Ben, Robert N. [Reprint Author]; Wang, J. B.; Horwath, Kathleen
CORPORATE SOURCE: Department of Chemistry, State University of New York at Binghamton, Binghamton, NY, 13902, USA
SOURCE: Cell Biochemistry and Biophysics, (2003) Vol. 38, No. 2, pp. 115-124. print.
ISSN: 1085-9195.
DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 6 Aug 2003
Last Updated on STN: 6 Aug 2003

L1 ANSWER 19 OF 73 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
TI Ice binding, **recrystallization inhibition**, and cryoprotective properties of ice-active substances associated with Antarctic sea ice diatoms.
AB Extracellular macromolecules associated with Antarctic sea ice diatoms were previously shown to have ice-binding activities. The function of these ice-active substances (IASs) has not been identified. Here we show that two of the IASs have a strong ability to inhibit the recrystallization of ice, possibly signifying a cryoprotectant function. To test this possibility, two species of marine diatom (one Antarctic and one temperate) were subjected to a single freeze-thaw cycle (approximately 20 h at -4 to -5degreeC) in the presence or absence of IAS. Viability, based on a double staining technique, was 15-29% higher in the presence of IAS. Etching of single crystal ice hemispheres grown from dilute IAS solutions indicated that the IASs bind to specific faces of ice and are incorporated into the ice lattice. Together, these results suggest that the IASs acts as a cryoprotectant, probably through some ice-binding mechanism.
ACCESSION NUMBER: 2003:286863 BIOSIS
DOCUMENT NUMBER: PREV200300286863

TITLE: Ice binding, **recrystallization inhibition** , and cryoprotective properties of ice-active substances associated with Antarctic sea ice diatoms.
AUTHOR(S): Raymond, James A. [Reprint Author]; Knight, Charles A.
CORPORATE SOURCE: Department of Biological Sciences, University of Nevada, 4505 Maryland Pkwy S., Las Vegas, NV, 89154, USA raymond@unlv.edu
SOURCE: Cryobiology, (April 2003) Vol. 46, No. 2, pp. 174-181. print.
CODEN: CRYBAS. ISSN: 0011-2240.
DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 19 Jun 2003
Last Updated on STN: 19 Jun 2003

L1 ANSWER 20 OF 73 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
TI The physico-chemical characterization of a boiling stable antifreeze protein from a perennial grass (Lolium perenne).
AB We have characterized a cold-induced, boiling stable antifreeze protein. This highly active ice **recrystallization inhibition** protein shows a much lower thermal hysteresis effect and displays binding behavior that is uncharacteristic of any AFP from fish or insects. Ice-binding studies show it binds to the (1 0 1 0) plane of ice and FTIR studies reveal that it has an unusual type of highly beta-sheeted secondary structure. Ice-binding studies of both glycosylated and nonglycosylated expressed forms indicate that it adsorbs to ice through the protein backbone. These results are discussed in light of the currently proposed mechanisms of AFP action.
ACCESSION NUMBER: 2003:151630 BIOSIS
DOCUMENT NUMBER: PREV200300151630
TITLE: The physico-chemical characterization of a boiling stable antifreeze protein from a perennial grass (Lolium perenne).
AUTHOR(S): Pudney, P. D. A. [Reprint Author]; Buckley, S. L. [Reprint Author]; Sidebottom, C. M.; Twigg, S. N.; Sevilla, M.-P.; Holt, C. B.; Roper, David; Telford, J. H.; McArthur, A. J.; Lillford, P. J.
CORPORATE SOURCE: Unilever Research, Colworth House, Sharnbrook, Bedford, MK44 1LQ, UK
Paul.Pudney@unilever.com; Sarah.L.Buckley@unilever.com
SOURCE: Archives of Biochemistry and Biophysics, (February 15 2003) Vol. 410, No. 2, pp. 238-245. print.
ISSN: 0003-9861 (ISSN print).
DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 19 Mar 2003
Last Updated on STN: 19 Mar 2003

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=> d his

     (FILE 'HOME' ENTERED AT 18:44:47 ON 25 AUG 2004)

     FILE 'MEDLINE, BIOSIS, WPIDS, FSTA, EMBASE, JAPIO, DGENE, HCAPLUS,
     USPATFULL' ENTERED AT 18:45:27 ON 25 AUG 2004
L1            73 S RECRYSTALLIZATION WITH INHIBITION
L2           231 S THERMAL HYSTERESIS PROTEIN
L3             6 S L2 AND L1
                 E HORWATH, K/AU
                 E MEYERS, K/AU

=> s l1 and ice recrystallization
L4            25 L1 AND ICE RECRYSTALLIZATION

=> s l4 and proteinaceous composition
```

L5 1 L4 AND PROTEINACEOUS COMPOSITION

=> d l5 ti abs ibib tot

L5 ANSWER 1 OF 1 USPATFULL on STN
TI Nucleic acid sequences encoding type III tenebrio antifreeze proteins and method for assaying activity
AB A **recrystallization inhibition** method for determining the presence, relative concentration, and/or activity of thermal hysteresis proteins comprising: providing a **proteinaceous composition** in a solvent to form a test solution; flash freezing said solution; raising the temperature of the frozen solution to an appropriate annealing temperature that allows for a partial melt, while limiting heterogeneity in ice grain sizes within said solution; maintaining said frozen solution at the annealing temperature for a length of time sufficient to allow for recrystallization; monitoring the ice crystal grain size changes over time; and determining the presence of functional thermal hysteresis proteins in said solution given the retention of significantly smaller ice crystal grain sizes relative to at least one control solution.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

ACCESSION NUMBER:	2002:307828 USPATFULL		
TITLE:	Nucleic acid sequences encoding type III tenebrio antifreeze proteins and method for assaying activity		
INVENTOR(S):	Horwath, Kathleen L., Endwell, NY, UNITED STATES Meyers, Kevin L., Trumansburg, NY, UNITED STATES		

	NUMBER	KIND	DATE
PATENT INFORMATION:	US 2002172951	A1	20021121
APPLICATION INFO.:	US 2001-876348	A1	20010607 (9)

	NUMBER	DATE
PRIORITY INFORMATION:	US 2000-210446P	20000608 (60)

DOCUMENT TYPE:	Utility
FILE SEGMENT:	APPLICATION
LEGAL REPRESENTATIVE:	Mark Levy, SALZMAN & LEVY, Ste. 902, 19 Chenango St., Binghamton, NY, 13901
NUMBER OF CLAIMS:	34
EXEMPLARY CLAIM:	1
NUMBER OF DRAWINGS:	131 Drawing Page(s)
LINE COUNT:	10121

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

=> d his

(FILE 'HOME' ENTERED AT 18:44:47 ON 25 AUG 2004)

FILE 'MEDLINE, BIOSIS, WPIDS, FSTA, EMBASE, JAPIO, DGENE, HCAPLUS, USPATFULL' ENTERED AT 18:45:27 ON 25 AUG 2004

L1	73	S RECRYSTALLIZATION WITH INHIBITION
L2	231	S THERMAL HYSTERESIS PROTEIN
L3	6	S L2 AND L1
		E HORWATH, K/AU
		E MEYERS, K/AU
L4	25	S L1 AND ICE RECRYSTALLIZATION
L5	1	S L4 AND PROTEINACEOUS COMPOSITION

=> d l4 ti abs ibib tot

L4 ANSWER 1 OF 25 MEDLINE on STN

TI A facile method for determining **ice recrystallization inhibition** by antifreeze proteins.

AB **Ice recrystallization**, the growth of large ice crystals at the expense of small ones, stresses freeze tolerant organisms and causes spoilage of frozen foods. This process is inhibited by antifreeze proteins (AFPs). Here, we present a simple method for determining the **ice recrystallization inhibition** (RI) activity of an AFP under physiological conditions using 10microl glass capillaries. Serial dilutions were prepared to determine the concentration below which RI activity was no longer detected, termed the RI endpoint. For type III AFP this was 200nM. The capillary method allows samples to be aligned and viewed simultaneously, which facilitates RI endpoint determination. Once prepared, the samples can be used reproducibly in subsequent RI assays and can be archived in a freezer for future reference. This method was used to detect the elution of type III AFP from a Sephadex G-75 size-exclusion column. RI activity was found at the expected V(e) for a 7kDa protein and also unexpectedly in the void volume.

ACCESSION NUMBER: 2003543488 MEDLINE
DOCUMENT NUMBER: PubMed ID: 14623287
TITLE: A facile method for determining **ice recrystallization inhibition** by antifreeze proteins.
AUTHOR: Tomczak Melanie M; Marshall Christopher B; Gilbert Jack A; Davies Peter L
CORPORATE SOURCE: Department of Biochemistry and the Protein Engineering Network of Centres of Excellence, Queen's University, Ont., K7L 3N6, Kingston, Canada.
SOURCE: Biochemical and biophysical research communications, (2003 Nov 28) 311 (4) 1041-6.
Journal code: 0372516. ISSN: 0006-291X.
PUB. COUNTRY: United States
DOCUMENT TYPE: (EVALUATION STUDIES)
Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 200402
ENTRY DATE: Entered STN: 20031119
Last Updated on STN: 20040210
Entered Medline: 20040209

L4 ANSWER 2 OF 25 MEDLINE on STN

TI The physico-chemical characterization of a boiling stable antifreeze protein from a perennial grass (Lolium perenne).

AB We have characterized a cold-induced, boiling stable antifreeze protein. This highly active **ice recrystallization inhibition** protein shows a much lower thermal hysteresis effect and displays binding behavior that is uncharacteristic of any AFP from fish or insects. Ice-binding studies show it binds to the (1 0 1 0) plane of ice and FTIR studies reveal that it has an unusual type of highly beta-sheeted secondary structure. Ice-binding studies of both glycosylated and nonglycosylated expressed forms indicate that it adsorbs to ice through the protein backbone. These results are discussed in light of the currently proposed mechanisms of AFP action.

ACCESSION NUMBER: 2003063106 MEDLINE
DOCUMENT NUMBER: PubMed ID: 12573283
TITLE: The physico-chemical characterization of a boiling stable antifreeze protein from a perennial grass (Lolium perenne).
AUTHOR: Pudney P D A; Buckley S L; Sidebottom C M; Twigg S N; Sevilla M-P; Holt C B; Roper David; Telford J H; McArthur A J; Lillford P J
CORPORATE SOURCE: Unilever Research, Colworth House, Sharnbrook, Bedford MK44 1LQ, UK.. Paul.Pudney@unilever.com
SOURCE: Archives of biochemistry and biophysics, (2003 Feb 15) 410

(2) 238-45.
Journal code: 0372430. ISSN: 0003-9861.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 200303
ENTRY DATE: Entered STN: 20030208
Last Updated on STN: 20030327
Entered Medline: 20030326

L4 ANSWER 3 OF 25 MEDLINE on STN
TI Semipurification and **ice recrystallization inhibition** activity of ice-active substances associated with Antarctic photosynthetic organisms.
AB Ice-active substances (IASs), i.e., macromolecular substances that modify the shape of growing ice crystals, were previously found to be associated with various terrestrial and aquatic photosynthetic organisms from Antarctica, but their chemical nature and function are unknown. In this study, we used the ice-binding properties of the IASs to semipurify IASs from a cyanobacterial mat, a eukaryotic green alga (Prasiola sp.), and a moss (Bryum sp.) and examined the **ice recrystallization inhibition** (RI) activities of the semipure materials. The semipure materials contain both protein and carbohydrate in which the carbohydrate accounted for 73, 52, and 37%, respectively, of the total carbohydrate + protein. The IASs had RI activity at concentrations of 1.4, 0.05, and 0.01 microg ml-1, respectively. RI activity was greatly reduced by heat treatment, suggesting that the IASs inhibit recrystallization through a specific interaction with ice. These results raise the possibility that the IASs increase freezing tolerance of their respective organisms by preventing the recrystallization of ice.

ACCESSION NUMBER: 2002135927 MEDLINE
DOCUMENT NUMBER: PubMed ID: 11812052
TITLE: Semipurification and **ice recrystallization inhibition** activity of ice-active substances associated with Antarctic photosynthetic organisms.
AUTHOR: Raymond J A; Fritsen C H
CORPORATE SOURCE: Department of Biological Sciences, University of Nevada, Las Vegas, Nevada 89154, USA.. raymond@unlv.edu
SOURCE: Cryobiology, (2001 Aug) 43 (1) 63-70.
Journal code: 0006252. ISSN: 0011-2240.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 200204
ENTRY DATE: Entered STN: 20020302
Last Updated on STN: 20020413
Entered Medline: 20020412

L4 ANSWER 4 OF 25 MEDLINE on STN
TI A theoretical model of a plant antifreeze protein from Lolium perenne.
AB Antifreeze proteins (AFPs), found in certain organisms enduring freezing environments, have the ability to inhibit damaging ice crystal growth. Recently, the repetitive primary sequence of the AFP of perennial ryegrass, Lolium perenne, was reported. This macromolecular antifreeze has high **ice recrystallization inhibition** activity but relatively low thermal hysteresis activity. We present here a theoretical three-dimensional model of this 118-residue plant protein based on a beta-roll domain with eight loops of 14-15 amino acids. The fold is supported by a conserved valine hydrophobic core and internal asparagine ladders at either end of the roll. Our model, which is the

first proposed for a plant AFP, displays two putative, opposite-facing, ice-binding sites with surface complementarity to the prism face of ice. The juxtaposition of the two imperfect ice-binding surfaces suggests an explanation for the protein's inferior thermal hysteresis but superior **ice recrystallization inhibition** activity and activity when compared with fish and insect AFPs.

ACCESSION NUMBER: 2001674827 MEDLINE
DOCUMENT NUMBER: PubMed ID: 11721016
TITLE: A theoretical model of a plant antifreeze protein from Lolium perenne.
AUTHOR: Kuiper M J; Davies P L; Walker V K
CORPORATE SOURCE: Department of Biology, Queen's University, Kingston, Ontario K7L 3N6, Canada.
SOURCE: Biophysical journal, (2001 Dec) 81 (6) 3560-5. Journal code: 0370626. ISSN: 0006-3495.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 200201
ENTRY DATE: Entered STN: 20011127
Last Updated on STN: 20020125
Entered Medline: 20020122

L4 ANSWER 5 OF 25 MEDLINE on STN
TI Expression of antifreeze proteins in transgenic plants.
AB The quality of frozen fruits and vegetables can be compromised by the damaging effects of ice crystal growth within the frozen tissue. Antifreeze proteins in the blood of some polar fishes have been shown to inhibit **ice recrystallization** at low concentrations. In order to determine whether expression of genes of this type confers improved freezing properties to plant tissue, we have produced transgenic tobacco and tomato plants which express genes encoding antifreeze proteins. The afa3 antifreeze gene was expressed at high steady-state mRNA levels in leaves from transformed plants, but we did not detect inhibition of **ice recrystallization** in tissue extracts. However, both mRNA and fusion proteins were detectable in transgenic tomato tissue containing a chimeric gene encoding a fusion protein truncated staphylococcal protein A and antifreeze protein. Furthermore, **ice recrystallization inhibition** was detected in this transgenic tissue.

ACCESSION NUMBER: 92032761 MEDLINE
DOCUMENT NUMBER: PubMed ID: 1932678
TITLE: Expression of antifreeze proteins in transgenic plants.
AUTHOR: Hightower R; Baden C; Penzes E; Lund P; Dunsmuir P
CORPORATE SOURCE: DNA Plant Technology Corporation, Oakland, CA 94608.
SOURCE: Plant molecular biology, (1991 Nov) 17 (5) 1013-21. Journal code: 9106343. ISSN: 0167-4412.
PUB. COUNTRY: Netherlands
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 199111
ENTRY DATE: Entered STN: 19920124
Last Updated on STN: 19920124
Entered Medline: 19911125

L4 ANSWER 6 OF 25 MEDLINE on STN
TI Solute effects on **ice recrystallization**: an assessment technique.
AB Reliable assessment of the effect of a solute upon **ice recrystallization** is accomplished with "splat cooling," the impaction of a small solution droplet onto a very cold metal plate. The ice disc has extremely small crystals, and recrystallization can be

followed without confusing effects caused by grain nucleation. This method confirms the exceptionally strong **recrystallization inhibition** effect of antifreeze protein from Antarctic fish and shows that grain growth rate is a sensitive function of both grain size and solute concentration.

ACCESSION NUMBER: 88166054 MEDLINE
DOCUMENT NUMBER: PubMed ID: 3349811
TITLE: Solute effects on **ice recrystallization** : an assessment technique.
AUTHOR: Knight C A; Hallett J; DeVries A L
CORPORATE SOURCE: National Center for Atmospheric Research, Boulder, Colorado 80307.
SOURCE: Cryobiology, (1988 Feb) 25 (1) 55-60. Journal code: 0006252. ISSN: 0011-2240.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 198804
ENTRY DATE: Entered STN: 19900308
Last Updated on STN: 19900308
Entered Medline: 19880428

L4 ANSWER 7 OF 25 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
TI A facile method for determining **ice recrystallization inhibition** by antifreeze proteins.
AB **Ice recrystallization**, the growth of large ice crystals at the expense of small ones, stresses freeze tolerant organisms and causes spoilage of frozen foods. This process is inhibited by antifreeze proteins (AFPs). Here, we present a simple method for determining the **ice recrystallization inhibition** (RI) activity of an AFP under physiological conditions using 10 mul glass capillaries. Serial dilutions were prepared to determine the concentration below which RI activity was no longer detected, termed the RI endpoint. For type III AFP this was 200 nM. The capillary method allows samples to be aligned and viewed simultaneously, which facilitates RI endpoint determination. Once prepared, the samples can be used reproducibly in subsequent RI assays and can be archived in a freezer for future reference. This method was used to detect the elution of type III AFP from a Sephadex G-75 size-exclusion column. RI activity was found at the expected Ve for a 7 kDa protein and also unexpectedly in the void volume.

ACCESSION NUMBER: 2004:64469 BIOSIS
DOCUMENT NUMBER: PREV200400065777
TITLE: A facile method for determining **ice recrystallization inhibition** by antifreeze proteins.
AUTHOR(S): Tomczak, Melanie M.; Marshall, Christopher B.; Gilbert, Jack A.; Davies, Peter L. [Reprint Author]
CORPORATE SOURCE: Department of Biochemistry and Protein Engineering Network of Centres of Excellence, Queens University, Kingston, ON, K7L 3N6, Canada
daviesp@post.queensu.ca
SOURCE: Biochemical and Biophysical Research Communications, (November 28 2003) Vol. 311, No. 4, pp. 1041-1046. print. CODEN: BBRCA9. ISSN: 0006-291X.
DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 28 Jan 2004
Last Updated on STN: 28 Jan 2004

L4 ANSWER 8 OF 25 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
TI The physico-chemical characterization of a boiling stable antifreeze protein from a perennial grass (Lolium perenne).

AB We have characterized a cold-induced, boiling stable antifreeze protein. This highly active **ice recrystallization inhibition** protein shows a much lower thermal hysteresis effect and displays binding behavior that is uncharacteristic of any AFP from fish or insects. Ice-binding studies show it binds to the (1 0 1 0) plane of ice and FTIR studies reveal that it has an unusual type of highly beta-sheeted secondary structure. Ice-binding studies of both glycosylated and nonglycosylated expressed forms indicate that it adsorbs to ice through the protein backbone. These results are discussed in light of the currently proposed mechanisms of AFP action.

ACCESSION NUMBER: 2003:151630 BIOSIS
DOCUMENT NUMBER: PREV200300151630
TITLE: The physico-chemical characterization of a boiling stable antifreeze protein from a perennial grass (Lolium perenne).
AUTHOR(S): Pudney, P. D. A. [Reprint Author]; Buckley, S. L. [Reprint Author]; Sidebottom, C. M.; Twigg, S. N.; Sevilla, M.-P.; Holt, C. B.; Roper, David; Telford, J. H.; McArthur, A. J.; Lillford, P. J.
CORPORATE SOURCE: Unilever Research, Colworth House, Sharnbrook, Bedford, MK44 1LQ, UK
Paul.Pudney@unilever.com; Sarah.L.Buckley@unilever.com
SOURCE: Archives of Biochemistry and Biophysics, (February 15 2003) Vol. 410, No. 2, pp. 238-245. print.
ISSN: 0003-9861 (ISSN print).
DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 19 Mar 2003
Last Updated on STN: 19 Mar 2003

L4 ANSWER 9 OF 25 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
TI Semipurification and **ice recrystallization inhibition** activity of ice-active substances associated with Antarctic photosynthetic organisms.
AB Ice-active substances (IASs), i.e., macromolecular substances that modify the shape of growing ice crystals, were previously found to be associated with various terrestrial and aquatic photosynthetic organisms from Antarctica, but their chemical nature and function are unknown. In this study, we used the ice-binding properties of the IASs to semipurify IASs from a cyanobacterial mat, a eukaryotic green alga (Prasiola sp.), and a moss (Bryum sp.) and examined the **ice recrystallization inhibition** (RI) activities of the semipure materials. The semipure materials contain both protein and carbohydrate in which the carbohydrate accounted for 73, 52, and 37%, respectively, of the total carbohydrate + protein. The IASs had RI activity at concentrations of 1.4, 0.05, and 0.01 mug ml-1, respectively. RI activity was greatly reduced by heat treatment, suggesting that the IASs inhibit recrystallization through a specific interaction with ice. These results raise the possibility that the IASs increase freezing tolerance of their respective organisms by preventing the recrystallization of ice.

ACCESSION NUMBER: 2002:194830 BIOSIS
DOCUMENT NUMBER: PREV200200194830
TITLE: Semipurification and **ice recrystallization inhibition** activity of ice-active substances associated with Antarctic photosynthetic organisms.
AUTHOR(S): Raymond, James A. [Reprint author]; Fritsen, Christian H.
CORPORATE SOURCE: Department of Biological Sciences, University of Nevada, Las Vegas, NV, 89154, USA
raymond@unlv.edu
SOURCE: Cryobiology, (August, 2001) Vol. 43, No. 1, pp. 63-70. print.
CODEN: CRYBAS. ISSN: 0011-2240.
DOCUMENT TYPE: Article
LANGUAGE: English

ENTRY DATE: Entered STN: 13 Mar 2002
Last Updated on STN: 13 Mar 2002

L4 ANSWER 10 OF 25 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
TI A theoretical model of a plant antifreeze protein from Lolium perenne.
AB Antifreeze proteins (AFPs), found in certain organisms enduring freezing environments, have the ability to inhibit damaging ice crystal growth. Recently, the repetitive primary sequence of the AFP of perennial ryegrass, Lolium perenne, was reported. This macromolecular antifreeze has high **ice recrystallization inhibition** activity but relatively low thermal hysteresis activity. We present here a theoretical three-dimensional model of this 118-residue plant protein based on a beta-roll domain with eight loops of 14-15 amino acids. The fold is supported by a conserved valine hydrophobic core and internal asparagine ladders at either end of the roll. Our model, which is the first proposed for a plant AFP, displays two putative, opposite-facing, ice-binding sites with surface complementarity to the prism face of ice. The juxtaposition of the two imperfect ice-binding surfaces suggests an explanation for the protein's inferior thermal hysteresis but superior **ice recrystallization inhibition** activity and activity when compared with fish and insect AFPs.
ACCESSION NUMBER: 2002:868 BIOSIS
DOCUMENT NUMBER: PREV200200000868
TITLE: A theoretical model of a plant antifreeze protein from Lolium perenne.
AUTHOR(S): Kuiper, Michael J.; Davies, Peter L.; Walker, Virginia K. [Reprint author]
CORPORATE SOURCE: Department of Biology, Queen's University, Kingston, Ontarion, K7L 3N6, Canada
walkervk@biology.queensu.ca
SOURCE: Biophysical Journal, (December, 2001) Vol. 81, No. 6, pp. 3560-3565. print.
CODEN: BIOJAU. ISSN: 0006-3495.
DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 28 Dec 2001
Last Updated on STN: 25 Feb 2002

L4 ANSWER 11 OF 25 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
TI A carrot leucine-rich-repeat protein that inhibits **ice recrystallization**.
AB Many organisms adapted to live at subzero temperatures express antifreeze proteins that improve their tolerance to freezing. Although structurally diverse, ail antifreeze proteins interact with ice surfaces, depress the freezing temperature of aqueous solutions, and inhibit ice crystal growth. A protein purified from carrot shares these functional features with antifreeze proteins of fish. Expression of the carrot complementary DNA in tobacco resulted in the accumulation of antifreeze activity in the apoplast of plants grown at greenhouse temperatures. The sequence of carrot antifreeze protein is similar to that of polygalacturonase inhibitor proteins and contains leucine-rich repeats.
ACCESSION NUMBER: 1998:473733 BIOSIS
DOCUMENT NUMBER: PREV199800473733
TITLE: A carrot leucine-rich-repeat protein that inhibits **ice recrystallization**.
AUTHOR(S): Worrall, Dawn; Elias, Luisa; Ashford, David; Smallwood, Maggie [Reprint author]; Sidebottom, Chris; Lillford, Peter; Telford, Julia; Holt, Chris; Bowles, Dianna
CORPORATE SOURCE: Plant Lab., Biol. Dep., Univ. York., P.O. Box 373, York YO1 5YW, UK
SOURCE: Science (Washington D C), (Oct. 2, 1998) Vol. 282, No. 5386, pp. 115-117. print.
CODEN: SCIEAS. ISSN: 0036-8075.
DOCUMENT TYPE: Article

LANGUAGE: English
ENTRY DATE: Entered STN: 5 Nov 1998
Last Updated on STN: 5 Nov 1998

L4 ANSWER 12 OF 25 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
TI Recrystallization in sugar/stabilizer solutions as affected by molecular structure.
AB The influence that a range of polysaccharides (galactomannans) had on **ice recrystallization** was determined. The concentration dependence of the **recrystallization inhibition** occurring with locust bean and guar gums was determined. The degree of galactose substitution in a range of enzyme modified guars was dominant in the effect of a galactomannan to inhibit recrystallization. The fine structure of the substituents were less important. Where the galactose content of comparable polysaccharides was similar the fine structure became dominant. The influence of sugar size on recrystallization was also investigated. Increasing molecular weight resulted in reduced recrystallization rates. The observed rates appeared to follow Williams -Landell-Ferry kinetics.
ACCESSION NUMBER: 1998:92274 BIOSIS
DOCUMENT NUMBER: PREV199800092274
TITLE: Recrystallization in sugar/stabilizer solutions as affected by molecular structure.
AUTHOR(S): Sutton, Robin L.; Cooke, David; Russell, Alison
CORPORATE SOURCE: Unilever Res., Colworth Lab., Colworth House, Sharnbrook, Bedfordshire MK44 1LQ, UK
SOURCE: Journal of Food Science, (Nov.-Dec., 1997) Vol. 62, No. 6, pp. 1145-1149. print.
CODEN: JFDSAZ. ISSN: 0022-1147.
DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 25 Feb 1998
Last Updated on STN: 25 Feb 1998

L4 ANSWER 13 OF 25 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
TI EXPRESSION OF ANTIFREEZE PROTEINS IN TRANSGENIC PLANTS.
AB Th quality of frozen fruits and vegetables can be compromised by the damaging effects of ice crystal growth within the frozen tissue. Antifreeze proteins in the blood of some polar fishes have been shown to inhibit **ice recrystallization** at low concentrations. In order to determine whether expression of genes of this type confers improved freezing properties to plant tissue, we have produced transenic tobacco and tomato plants which express genes encoding antifreeze proteins. The afa3 antifreeze gene was expressed at high steady-state mRNA levels in leaves from transformed plants, but we did not detect inhibition of **ice recrystallization** in tissue extracts. However, both mRNA and fusion proteins were detectable in transgenic tomato tissue containing a chimeric gene encoding a fusion protein between truncated staphylococcal protein A and antifreeze protein. Furthermore, **ice recrystallization inhibition** was detected in this transgenic tissue.
ACCESSION NUMBER: 1992:27792 BIOSIS
DOCUMENT NUMBER: PREV199293017067; BA93:17067
TITLE: EXPRESSION OF ANTIFREEZE PROTEINS IN TRANSGENIC PLANTS.
AUTHOR(S): HIGHTOWER R [Reprint author]; BADEN C; PENZES E; LUND P; DUNSMUIR P
CORPORATE SOURCE: DNA PLANT TECHNOL CORP, 6701 SAN PABLO AVE, OAKLAND, CALIF 94608, USA
SOURCE: Plant Molecular Biology, (1991) Vol. 17, No. 5, pp. 1013-1022.
CODEN: PMBIDB. ISSN: 0167-4412.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH

ENTRY DATE: Entered STN: 6 Jan 1992
Last Updated on STN: 6 Jan 1992

L4 ANSWER 14 OF 25 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
TI SOLUTE EFFECTS ON **ICE RECRYSTALLIZATION** AN ASSESSMENT TECHNIQUE.
AB Reliable assessment of the effect of a solute upon **ice recrystallization** is accomplished with "splat cooling," the impaction of a small solution droplet onto a very cold metal plate. The ice disc has extremely small crystals, and recrystallization can be followed without confusing effects caused by grain nucleation. This method confirms the exceptionally strong **recrystallization inhibition** effect of antifreeze protein from Antarctic fish and shows that grain growth rate is a sensitive function of both grain size and solute concentration.
ACCESSION NUMBER: 1988:183973 BIOSIS
DOCUMENT NUMBER: PREV198885096075; BA85:96075
TITLE: SOLUTE EFFECTS ON **ICE RECRYSTALLIZATION** AN ASSESSMENT TECHNIQUE.
AUTHOR(S): KNIGHT C A [Reprint author]; HALLETT J; DEVRIES A L
CORPORATE SOURCE: NATL CENTER ATMOSPHERIC RES, BOULDER, COLORADO 80307, USA
SOURCE: Cryobiology, (1988) Vol. 25, No. 1, pp. 55-60.
CODEN: CRYBAS. ISSN: 0011-2240.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 11 Apr 1988
Last Updated on STN: 11 Apr 1988

L4 ANSWER 15 OF 25 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN
TI New plant anti-freeze protein useful in frozen food products.
AN 1999-458697 [38] WPIDS
AB WO 9937782 A UPAB: 19990922
NOVELTY - A plant anti-freeze protein characterized in that at least 40% of its amino acids are from the group of serine, threonine and asparagine, is new.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(1) a nucleic acid sequence capable of encoding the anti-freeze protein as above;

(2) a frozen food product comprising the anti-freeze protein;

(3) a method of obtaining an anti-freeze protein as above, where the protein is produced by a genetically modified organism; and

(4) a plant, capable of expressing the anti-freeze protein and having an increased frost tolerance.

ACTIVITY - None Given.

MECHANISM OF ACTION - None Given.

USE - The anti-freeze protein can be used in frozen food products, especially frozen confectionery (claimed). Anti-freeze proteins are especially used in food products, which are heated, e.g. by pasteurization, blanching or sterilization prior to freezing. Plants transformed with a nucleic acid sequence encoding the anti-freeze protein have an increased frost tolerance (claimed).

ADVANTAGE - Prior art anti-freeze proteins have not been applied to commercially available food products, due to high costs and complicated process for obtaining the protein. Also prior art anti-freeze proteins have tended to destabilize during processing especially during the pasteurization step. This is overcome by the present anti-freeze protein. The anti-freeze proteins provide an ice particle size following an **ice recrystallization inhibition** assay of 15 mu M or less. The anti-freeze protein ingredient means that mixes can be frozen under quiescent conditions, e.g. in a shop or home freezer without the formation of unacceptable ice crystal shapes and hence with a texture different to products normally obtained via quiescent freezing.

Dwg.0/0

ACCESSION NUMBER: 1999-458697 [38] WPIDS
DOC. NO. NON-CPI: N1999-343101
DOC. NO. CPI: C1999-134718
TITLE: New plant anti-freeze protein useful in frozen food products.
DERWENT CLASS: B04 C06 D13 D16 P13
INVENTOR(S): JARMAN, C D; SIDEBOTTOM, C M; TWIGG, S; WORRALL, D
PATENT ASSIGNEE(S): (JARM-I) JARMAN C D; (UNIL) UNILEVER PLC; (UNIL) UNILEVER NV
COUNTRY COUNT: 85
PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG
WO 9937782	A2	19990729	(199938)*	EN	39
RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL OA PT SD SE SZ UG ZW					
W: AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG US UZ VN YU ZW					
AU 9924188	A	19990809	(200001)		
BR 9814776	A	20001024	(200058)		
EP 1049783	A2	20001108	(200062)	EN	
R: AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE					
CZ 2000002696	A3	20001213	(200103)		
SK 2000001095	A3	20010212	(200112)		
CN 1290300	A	20010404	(200140)		
HU 2001001252	A2	20010828	(200157)		
MX 2000007100	A1	20010301	(200170)		
JP 2002504316	W	20020212	(200215)		39
AU 747087	B	20020509	(200238)		
IL 137256	A	20040104	(200411)		

APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
WO 9937782	A2	WO 1998-EP8553	19981223
AU 9924188	A	AU 1999-24188	19981223
BR 9814776	A	BR 1998-14776	19981223
		WO 1998-EP8553	19981223
EP 1049783	A2	EP 1998-966702	19981223
		WO 1998-EP8553	19981223
CZ 2000002696	A3	WO 1998-EP8553	19981223
		CZ 2000-2696	19981223
SK 2000001095	A3	WO 1998-EP8553	19981223
		SK 2000-1095	19981223
CN 1290300	A	CN 1998-813922	19981223
HU 2001001252	A2	WO 1998-EP8553	19981223
		HU 2001-1252	19981223
MX 2000007100	A1	MX 2000-7100	20000720
JP 2002504316	W	WO 1998-EP8553	19981223
		JP 2000-528689	19981223
AU 747087	B	AU 1999-24188	19981223
IL 137256	A	IL 1998-137256	19981223

FILING DETAILS:

PATENT NO	KIND		PATENT NO
AU 9924188	A	Based on	WO 9937782
BR 9814776	A	Based on	WO 9937782

EP 1049783	A2	Based on	WO 9937782
CZ 2000002696	A3	Based on	WO 9937782
HU 2001001252	A2	Based on	WO 9937782
JP 2002504316	W	Based on	WO 9937782
AU 747087	B	Previous Publ.	AU 9924188
		Based on	WO 9937782
IL 137256	A	Based on	WO 9937782

PRIORITY APPLN. INFO: GB 1998-1408 19980122

L4 ANSWER 16 OF 25 EMBASE COPYRIGHT 2004 ELSEVIER INC. ALL RIGHTS RESERVED. on STN

TI A facile method for determining **ice recrystallization inhibition** by antifreeze proteins.

AB **Ice recrystallization**, the growth of large ice crystals at the expense of small ones, stresses freeze tolerant organisms and causes spoilage of frozen foods. This process is inhibited by antifreeze proteins (AFPs). Here, we present a simple method for determining the **ice recrystallization inhibition** (RI) activity of an AFP under physiological conditions using 10μl glass capillaries. Serial dilutions were prepared to determine the concentration below which RI activity was no longer detected, termed the RI endpoint. For type III AFP this was 200nM. The capillary method allows samples to be aligned and viewed simultaneously, which facilitates RI endpoint determination. Once prepared, the samples can be used reproducibly in subsequent RI assays and can be archived in a freezer for future reference. This method was used to detect the elution of type III AFP from a Sephadex G-75 size-exclusion column. RI activity was found at the expected V(e) for a 7kDa protein and also unexpectedly in the void volume.

ACCESSION NUMBER: 2003461856 EMBASE
TITLE: A facile method for determining **ice recrystallization inhibition** by antifreeze proteins.
AUTHOR: Tomczak M.M.; Marshall C.B.; Gilbert J.A.; Davies P.L.
CORPORATE SOURCE: P.L. Davies, Department of Biochemistry, Protein Eng. Netwk. Centres E., Queen's University, Kingston, Ont. K7L 3N6, Canada. daviesp@post.queensu.ca
SOURCE: Biochemical and Biophysical Research Communications, (28 Nov 2003) 311/4 (1041-1046).
Refs: 21
ISSN: 0006-291X CODEN: BBRCA
COUNTRY: United States
DOCUMENT TYPE: Journal; Article
FILE SEGMENT: 029 Clinical Biochemistry
LANGUAGE: English
SUMMARY LANGUAGE: English

L4 ANSWER 17 OF 25 EMBASE COPYRIGHT 2004 ELSEVIER INC. ALL RIGHTS RESERVED. on STN

TI The physico-chemical characterization of a boiling stable antifreeze protein from a perennial grass (Lolium perenne).

AB We have characterized a cold-induced, boiling stable antifreeze protein. This highly active **ice recrystallization inhibition** protein shows a much lower thermal hysteresis effect and displays binding behavior that is uncharacteristic of any AFP from fish or insects. Ice-binding studies show it binds to the (1010) plane of ice and FTIR studies reveal that it has an unusual type of highly β-sheeted secondary structure. Ice-binding studies of both glycosylated and nonglycosylated expressed forms indicate that it adsorbs to ice through the protein backbone. These results are discussed in light of the currently proposed mechanisms of AFP action.

ACCESSION NUMBER: 2003094589 EMBASE

TITLE: The physico-chemical characterization of a boiling stable antifreeze protein from a perennial grass (Lolium perenne).
AUTHOR: Pudney P.D.A.; Buckley S.L.; Sidebottom C.M.; Twigg S.N.; Sevilla M.-P.; Holt C.B.; Roper D.; Telford J.H.; McArthur A.J.; Lillford P.J.
CORPORATE SOURCE: P.D.A. Pudney, Unilever Research, Colworth House, Sharnbrook, Bedford MK44 1LQ, United Kingdom. Paul.Pudney@unilever.com
SOURCE: Archives of Biochemistry and Biophysics, (15 Feb 2003) 410/2 (238-245).
Refs: 34
ISSN: 0003-9861 CODEN: ABBIA4
COUNTRY: United States
DOCUMENT TYPE: Journal; Article
FILE SEGMENT: 029 Clinical Biochemistry
LANGUAGE: English
SUMMARY LANGUAGE: English

L4 ANSWER 18 OF 25 EMBASE COPYRIGHT 2004 ELSEVIER INC. ALL RIGHTS RESERVED. on STN
TI Semipurification and **ice recrystallization inhibition** activity of ice-active substances associated with antarctic photosynthetic organisms.
AB Ice-active substances (IASs), i.e., macromolecular substances that modify the shape of growing ice crystals, were previously found to be associated with various terrestrial and aquatic photosynthetic organisms from Antarctica, but their chemical nature and function are unknown. In this study, we used the ice-binding properties of the IASs to semipurify IASs from a cyanobacterial mat, a eukaryotic green alga (Prasiola sp.), and a moss (Bryum sp.) and examined the **ice recrystallization inhibition** (RI) activities of the semipure materials. The semipure materials contain both protein and carbohydrate in which the carbohydrate accounted for 73, 52, and 37%, respectively, of the total carbohydrate + protein. The IASs had RI activity at concentrations of 1.4, 0.05, and 0.01 μg ml(-1), respectively. RI activity was greatly reduced by heat treatment, suggesting that the IASs inhibit recrystallization through a specific interaction with ice. These results raise the possibility that the IASs increase freezing tolerance of their respective organisms by preventing the recrystallization of ice. .COPYRGT. 2001 Elsevier Science.
ACCESSION NUMBER: 2002061328 EMBASE
TITLE: Semipurification and **ice recrystallization inhibition** activity of ice-active substances associated with antarctic photosynthetic organisms.
AUTHOR: Raymond J.A.; Fritsen C.H.
CORPORATE SOURCE: J.A. Raymond, Department of Biological Sciences, University of Nevada, Las Vegas, NV 89154, United States. raymond@unlv.edu
SOURCE: Cryobiology, (2002) 43/1 (63-70).
Refs: 20
ISSN: 0011-2240 CODEN: CRYBAS
COUNTRY: United States
DOCUMENT TYPE: Journal; Article
FILE SEGMENT: 004 Microbiology
LANGUAGE: English
SUMMARY LANGUAGE: English

L4 ANSWER 19 OF 25 EMBASE COPYRIGHT 2004 ELSEVIER INC. ALL RIGHTS RESERVED. on STN
TI A theoretical model of a plant antifreeze protein from Lolium perenne.
AB Antifreeze proteins (AFPs), found in certain organisms enduring freezing environments, have the ability to inhibit damaging ice crystal growth. Recently, the repetitive primary sequence of the AFP of perennial ryegrass, Lolium perenne, was reported. This macromolecular antifreeze has

high **ice recrystallization inhibition**
activity but relatively low thermal hysteresis activity. We present here a theoretical three-dimensional model of this 118-residue plant protein based on a B-roll domain with eight loops of 14-15 amino acids. The fold is supported by a conserved valine hydrophobic core and internal asparagine ladders at either end of the roll. Our model, which is the first proposed for a plant AFP, displays two putative, opposite-facing, ice-binding sites with surface complementarity to the prism face of ice. The juxtaposition of the two imperfect ice-binding surfaces suggests an explanation for the protein's inferior thermal hysteresis but superior **ice recrystallization inhibition** activity and
activity when compared with fish and insect AFPs.

ACCESSION NUMBER: 2001423903 EMBASE
TITLE: A theoretical model of a plant antifreeze protein from Lolium perenne.
AUTHOR: Kuiper M.J.; Davies P.L.; Walker V.K.
CORPORATE SOURCE: Dr. V.K. Walker, Queen's Universuty, Department of Biology, Kingston, Ont. K7L 3N6, Canada. walkervk@biology.queensu.ca
SOURCE: Biophysical Journal, (2001) 81/6 (3560-3565).
Refs: 36
ISSN: 0006-3495 CODEN: BIOJAU
COUNTRY: United States
DOCUMENT TYPE: Journal; Article
FILE SEGMENT: 029 Clinical Biochemistry
LANGUAGE: English
SUMMARY LANGUAGE: English

L4 ANSWER 20 OF 25 HCAPLUS COPYRIGHT 2004 ACS on STN
TI A facile method for determining **ice recrystallization inhibition** by antifreeze proteins
AB The authors present a simple method for determining the ice recrystn. inhibition
(RI) activity of an antifreeze protein (AFP) under physiol. conditions using 10 μl glass capillaries. Serial dilns. were prepared to determine the concentration below which RI activity was no longer detected, termed the RI endpoint. For type III AFP this was 200 nM. The capillary method allows samples to be aligned and viewed simultaneously, which facilitates RI endpoint determination Once prepared, the samples can be used reproducibly in subsequent RI assays and can be archived in a freezer for future reference This method was used to detect the elution of type III AFP from a Sephadex G-75 size-exclusion column. RI activity was found at the expected Ve for a 7 kDa protein and also unexpectedly in the void volume

ACCESSION NUMBER: 2003:883142 HCAPLUS
DOCUMENT NUMBER: 140:144944
TITLE: A facile method for determining **ice recrystallization inhibition** by antifreeze proteins
AUTHOR(S): Tomczak, Melanie M.; Marshall, Christopher B.; Gilbert, Jack A.; Davies, Peter L.
CORPORATE SOURCE: Department of Biochemistry and the Protein Engineering Network of Centres of Excellence, Queen's University, Kingston, ON, K7L 3N6, Can.
SOURCE: Biochemical and Biophysical Research Communications (2003), 311(4), 1041-1046
CODEN: BBRCA9; ISSN: 0006-291X
PUBLISHER: Elsevier Science
DOCUMENT TYPE: Journal
LANGUAGE: English
REFERENCE COUNT: 21 THERE ARE 21 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L4 ANSWER 21 OF 25 HCAPLUS COPYRIGHT 2004 ACS on STN
TI Semipurification and **Ice Recrystallization Inhibition** Activity of Ice-Active Substances Associated with

Antarctic Photosynthetic Organisms

AB Ice-active substances (IASs), i.e., macromol. substances that modify the shape of growing ice crystals, were previously found to be associated with various terrestrial and aquatic photosynthetic organisms from Antarctica, but their chemical nature and function are unknown. In this study, we used the ice-binding properties of the IASs to semipurify IASs from a cyanobacterial mat, a eukaryotic green alga (Prasiola sp.), and a moss (Bryum sp.) and examined the ice recrystn. inhibition (RI) activities of the semipure materials. The semipure materials contain both protein and carbohydrate in which the carbohydrate accounted for 73, 52, and 37%, resp., of the total carbohydrate + protein. The IASs had RI activity at concns. of 1.4, 0.05, and 0.01 μg ml-1, resp. RI activity was greatly reduced by heat treatment, suggesting that the IASs inhibit recrystn. through a specific interaction with ice. These results raise the possibility that the IASs increase freezing tolerance of their resp. organisms by preventing the recrystn. of ice. (c) 2001 Academic Press.

ACCESSION NUMBER: 2002:73663 HCAPLUS
DOCUMENT NUMBER: 136:365450
TITLE: Semipurification and **Ice Recrystallization Inhibition** Activity of Ice-Active Substances Associated with Antarctic Photosynthetic Organisms
AUTHOR(S): Raymond, James A.; Fritsen, Christian H.
CORPORATE SOURCE: Department of Biological Sciences, University of Nevada, Las Vegas, NV, 89154, USA
SOURCE: Cryobiology (2001), 43(1), 63-70
CODEN: CRYBAS; ISSN: 0011-2240
PUBLISHER: Academic Press
DOCUMENT TYPE: Journal
LANGUAGE: English
REFERENCE COUNT: 20 THERE ARE 20 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L4 ANSWER 22 OF 25 USPATFULL on STN

TI Antifreeze proteins from basidiomycetes

AB The present invention provides antifreeze proteins produced by a basidiomycete. The antifreeze protein has a high antifreeze activity such as a thermal hysteresis activity or an **ice-recrystallization inhibition** activity.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

ACCESSION NUMBER: 2003:257833 USPATFULL
TITLE: Antifreeze proteins from basidiomycetes
INVENTOR(S): Hoshino, Tamotsu, Hokkaido, JAPAN
Kiriaki, Michiko, Hokkaido, JAPAN
Tsuda, Sakae, Hokkaido, JAPAN
Ohgiya, Satoru, Hokkaido, JAPAN
Kondo, Hidemasa, Hokkaido, JAPAN
Yokota, Yuji, Hokkaido, JAPAN
Yumoto, Isao, Hokkaido, JAPAN
PATENT ASSIGNEE(S): NATIONAL INSTITUTE OF ADVANCED INDUSTRIAL SCIENCE AND TECHNOLOGY (non-U.S. corporation)

	NUMBER	KIND	DATE	
PATENT INFORMATION:	US 2003180884	A1	20030925	
APPLICATION INFO.:	US 2003-386529	A1	20030313	(10)

	NUMBER	DATE
PRIORITY INFORMATION:	JP 2002-72612	20020315
	JP 2003-57888	20030305

DOCUMENT TYPE: Utility
FILE SEGMENT: APPLICATION

LEGAL REPRESENTATIVE: SUGHRUE MION, PLLC, 2100 PENNSYLVANIA AVENUE, N.W., WASHINGTON, DC, 20037
NUMBER OF CLAIMS: 18
EXEMPLARY CLAIM: 1
NUMBER OF DRAWINGS: 2 Drawing Page(s)
LINE COUNT: 1247
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L4 ANSWER 23 OF 25 USPATFULL on STN
TI Nucleic acid sequences encoding type III tenebrio antifreeze proteins and method for assaying activity
AB Thermal hysteresis proteins and their nucleotide sequences derived from the Tenebrionoidea Superfamily which lower the freezing point of a solution without effecting the melting point. Related methods for preparing said proteins and for providing antifreeze or **recrystallization inhibition** properties to a subject formulation.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
ACCESSION NUMBER: 2002:307900 USPATFULL
TITLE: Nucleic acid sequences encoding type III tenebrio antifreeze proteins and method for assaying activity
INVENTOR(S): Horwath, Kathleen L., Endwell, NY, UNITED STATES
Easton, Christopher M., Ithaca, NY, UNITED STATES

	NUMBER	KIND	DATE
PATENT INFORMATION:	US 2002173024	A1	20021121
APPLICATION INFO.:	US 2001-876796	A1	20010607 (9)

	NUMBER	DATE
PRIORITY INFORMATION:	US 2000-210446P	20000608 (60)

DOCUMENT TYPE: Utility
FILE SEGMENT: APPLICATION
LEGAL REPRESENTATIVE: Mark Levy, SALZMAN & LEVY, Ste. 902, 19 Chenango St., Binghamton, NY, 13901
NUMBER OF CLAIMS: 40
EXEMPLARY CLAIM: 1
NUMBER OF DRAWINGS: 131 Drawing Page(s)
LINE COUNT: 10082
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L4 ANSWER 24 OF 25 USPATFULL on STN
TI Nucleic acid sequences encoding type III tenebrio antifreeze proteins and method for assaying activity
AB A **recrystallization inhibition** method for determining the presence, relative concentration, and/or activity of thermal hysteresis proteins comprising: providing a proteinaceous composition in a solvent to form a test solution; flash freezing said solution; raising the temperature of the frozen solution to an appropriate annealing temperature that allows for a partial melt, while limiting heterogeneity in ice grain sizes within said solution; maintaining said frozen solution at the annealing temperature for a length of time sufficient to allow for recrystallization; monitoring the ice crystal grain size changes over time; and determining the presence of functional thermal hysteresis proteins in said solution given the retention of significantly smaller ice crystal grain sizes relative to at least one control solution.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
ACCESSION NUMBER: 2002:307828 USPATFULL
TITLE: Nucleic acid sequences encoding type III tenebrio antifreeze proteins and method for assaying activity

INVENTOR(S): Horwath, Kathleen L., Endwell, NY, UNITED STATES
Meyers, Kevin L., Trumansburg, NY, UNITED STATES

	NUMBER	KIND	DATE
PATENT INFORMATION:	US 2002172951	A1	20021121
APPLICATION INFO.:	US 2001-876348	A1	20010607 (9)

	NUMBER	DATE
PRIORITY INFORMATION:	US 2000-210446P	20000608 (60)

DOCUMENT TYPE: Utility
FILE SEGMENT: APPLICATION
LEGAL REPRESENTATIVE: Mark Levy, SALZMAN & LEVY, Ste. 902, 19 Chenango St., Binghamton, NY, 13901
NUMBER OF CLAIMS: 34
EXEMPLARY CLAIM: 1
NUMBER OF DRAWINGS: 131 Drawing Page(s)
LINE COUNT: 10121
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L4 ANSWER 25 OF 25 USPATFULL on STN
TI Ice crystal growth suppression polypeptides and method of making
AB Novel methods of improving freezing tolerance of organic materials through the use of antifreeze polypeptides is provided. These polypeptides increase the storage life of foodstuffs and biologics, as well as protect plant products, such as during growth. The antifreeze polypeptides, or their fusion proteins, may be produced chemically or by recombinant DNA techniques, and then purified for a variety of uses.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
ACCESSION NUMBER: 92:44933 USPATFULL
TITLE: Ice crystal growth suppression polypeptides and method of making
INVENTOR(S): Warren, Gareth J., San Francisco, CA, United States
Mueller, Gunhild M., San Francisco, CA, United States
McKown, Robert L., Albany, CA, United States
PATENT ASSIGNEE(S): DNA Plant Technology Corporation, Oakland, CA, United States (U.S. corporation)

	NUMBER	KIND	DATE
PATENT INFORMATION:	US 5118792		19920602
APPLICATION INFO.:	US 1989-350481		19890510 (7)

DOCUMENT TYPE: Utility
FILE SEGMENT: Granted
PRIMARY EXAMINER: Robinson, Douglas W.
ASSISTANT EXAMINER: Weber, Jon P.
LEGAL REPRESENTATIVE: Townsend and Townsend
NUMBER OF CLAIMS: 7
EXEMPLARY CLAIM: 1
NUMBER OF DRAWINGS: 30 Drawing Figure(s); 29 Drawing Page(s)
LINE COUNT: 1850
CAS INDEXING IS AVAILABLE FOR THIS PATENT.